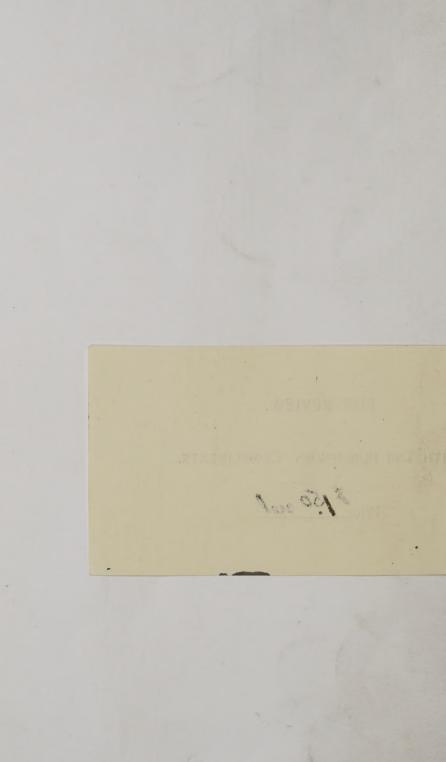




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## TRANSACTIONS

OF THE

## EIGHTH ANNUAL MEETING

OF THE

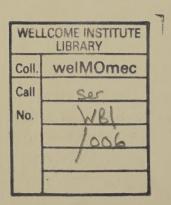
# AMERICAN CLIMATOLOGICAL ASSOCIATION,

HELD AT

WASHINGTON, D. C.,

September 22, 23, 24, and 25, 1891.

PHILADELPHIA:
W. B. SAUNDERS,
913 WALNUT STREET,
1892.



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WROTH, JAMES H., Albuquerque, N. M.



## MINUTES.

THE eighth annual meeting of the American Climatological Association was held at Washington, September 22d to 24th inclusive, 1891, in connection with the Congress of American Physicians and Surgeons.

There were present fifty members.

The President, Dr. Frederick I. Knight, of Boston, occupied the chair at all the sessions. Interesting and valuable papers were read and discussed. All appear in this volume, excepting those by Drs. F. F. Smith and I. Hilgard Tyndale, which had previously been promised to other medical periodicals.

During the first session, the Chair announced the following Committee to Nominate Officers for the ensuing year: Drs. R. G. Curtin, Carl von Ruck, F. H. Bosworth, E. L. Shurly, and S. A. Fisk.

Dr. H. F. Williams and I. Hull Platt were appointed a committee to audit the Treasurer's report, and to report at the business meeting.

The session for business was called to order by President Knight Wednesday, September 22d, at 1 P. M. The minutes of the last business meeting were read and approved.

The Treasurer presented his report, showing a deficit of \$110.67, which the auditing committee announced to be correct.

The Committee on Nominations presented the following ticket for officers for 1892:—

President, Dr. Willis E. Ford, Utica.

Vice-Presidents, Dr. E. Fletcher Ingals, Chicago.

Dr. Beverley Robinson, New York.

Secretary and Treasurer, Dr. J. B. Walker, Philadelphia. Member of Council, Dr. Frederick I. Knight, Boston.

Representative to Congress, Dr. J. B. Walker, Philadelphia.

Alternate, Dr. W. W. Johnston, Washington.

The following recommendations of the Council were adopted:—

- 1. That the papers read at this meeting be given to "The Climatologist," in consideration of their offer to furnish one hundred and twenty-five (125) bound and twenty-five (25) unbound volumes of Transactions free of extra charge, and that all writers of papers be requested to contribute their papers to the Association for this purpose. On motion of Dr. Bosworth, it was resolved that all papers hereafter read before the Association shall be entirely at the disposal of the Association for publication. Notice to this effect shall be incorporated in the preliminary notice of the meeting.
- 2. The following names were dropped from the roll of members in accordance with Art. 3, By-Laws: Drs. D. E. Barger, George W. Foster, Talbot Jones, W. D. McDougal, J. P. Widney, and G. Wilds Linn.
  - 3. The following gentlemen were elected to membership:—

Dr. Carl Ruedi, Denver.

Dr. E. W. Watson, Philadelphia.

Dr. Jos. A. Hart, Colorado Springs.

Dr. H. B. Moore, Colorado Springs.

Dr. C. E. Quimby, New York.

Dr. Jno. W. Brannan, New York.

Dr. J. P. Crozer Griffith, Philadelphia. Dr. C. C. Ransom, Richfield Springs.

4. They recommend that the Constitution be amended as follows:—

Art. IV., Sec. 3. The election of officers shall take place at the business meeting.

And the By-Laws amended thus: —

Section I. Strike out the phrase "and last two days."

Section IV. Strike out all except that portion relating to the business meeting.

These amendments were held for consideration until next meeting.

5. The next meeting of the Association shall be held at Richfield Springs, at such time in June as shall be determined upon by the President and Secretary.

The severe illness of our esteemed honorary member, Dr. Henry

I. Bowditch, was feelingly referred to by the President and Dr. H. F. Williams, and a resolution conveying the sympathies of his fellow-members was unanimously voted to his son, Dr. Vincent Y. Bowditch, which the Secretary was directed to forward.

The Secretary was requested to attempt a settlement of the long-standing account of D. Appleton & Co., for the publication of Vol. III. of the Transactions.

The business meeting then adjourned.

A banquet, under the management of Drs. W. W. Johnston and F. H. Bosworth, was enjoyed by thirty-one (31) members in the parlors at Wormley's, where good fellowship and fraternity were again pledged in support of The American Climatological Association.

J. B. WALKER,

Secretary.

## OFFICERS OF THE ASSOCIATION,

1892.

#### President:

DR. WILLIS E. FORD, Utica, N. Y.

## Vice-Presidents:

Dr. E. FLETCHER INGALS, Chicago. Dr. BEVERLEY ROBINSON, New York.

## Secretary and Treasurer:

Dr. J. B. WALKER, Philadelphia.

## Council:

Dr. R. G. CURTIN, Philadelphia.

Dr. S. E. SOLLY, Colorado Springs.

Dr. E. L. SHURLY, Detroit.

Dr. A. L. LOOMIS, New York.

DR. FREDERICK I. KNIGHT, Boston.

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## CONTENTS.

	PAGE
Officers for 1891	. iii
LIST OF MEMBERS	. v
MINUTES	ix
MINUTES	. xiii
PRESIDENTIAL ADDRESS BEFORE THE AMERICAN CLIMATOLOGICAN	
Association. Frederick I. Knight	. 1
WHOOPING-COUGH: ITS MANAGEMENT: ITS CLIMATIC TREAT-	
MENT. J. H. Musser, M.D	. 8
MEDICAL TREATMENT OF PLEURISY. G. M. Garland, M.D	
Notes on General versus Local Treatment of Catarrhai	,
INFLAMMATIONS OF THE UPPER AIR-TRACT. Beverley	7
Robinson, M.D	. 20
DISCUSSION. Drs. F. H. Bosworth and E. L. Shurly	. 34
A STUDY OF THE SPUTUM IN PULMONARY CONSUMPTION. E. L.	
Shurly, M.D	36
DISCUSSION. Drs. J. H. Tyndale, A. L. Gihon, H. F. Williams	45
GYMNASTIC EXERCISE AS A PROPHYLACTIC AND CURATIVE REMEDY	
IN CHEST DISEASES. Edward O. Otis, M.D	47
DISCUSSION. Drs. H. F. Williams, A. L. Gihon, Edward O. Otis	56
THE HISTOLOGICAL CHANGES WHICH TAKE PLACE IN THE LUNGS	3
IN CURED PHTHISIS PULMONALIS, AND THE INFLUENCE OF	•
DIATHESIS IN THE DEVELOPMENT OF SUCH CHANGE. Alfred	
L. Loomis, M.D., LL.D	59
DISCUSSION. Drs. Frank Fremont-Smith, A. Jacobi, H. F. Wil-	
liams, Alfred L. Loomis, R. G. Curtin, J. H. Tyndale	66
FURTHER CONSIDERATION OF THE ANALYSIS OF RECORDED CASES	
OF PHTHISIS PULMONALIS. S. A. Fisk, M.D	71
Discussion. Dr. J. H. Tyndale	76
THE CLIMATE OF THE GREATER PIÉDMONT AND MOUNTAINOUS	
REGIONS OF THE SOUTHERN UNITED STATES. W. C. Van	
Bibber, M.D	77
DISCUSSION. Dr. Karl von Ruck	
EPIDEMIOLOGY OF INFLUENZA AND ITS RELATIONS TO CATARRHAL	
FEVER. Roland G. Curtin, M.D., and Edward W. Watson,	
M.D	
NERVO-VASCULAR DISTURBANCES IN UNACCLIMATED PERSONS IN	
COLORADO. J. T. Eskridge, M.D	
EPIDEMIC OF INFLUENZA IN PHILADELPHIA IN 1889, '90, '91. Ro-	
land G. Curtin, M.D. and Edward W. Watson, M.D	109

#### CONTENTS.

	200 20
THE SURGICAL TREATMENT OF ACUTE AND CHRONIC EMPYEMA.	
Maurice H. Richardson, M.D	127
Discussion. Dr. Alfred L. Loomis	143
THE INJUSTICE OF REGARDING SUGGESTED MEANS FOR TREATING	
PHTHISIS AS ATTEMPTS TO DISCOVER A SPECIFIC CURE.	
H. F. Williams, M.D	145
DISCUSSION. Drs. J. H. Tyndale, Karl von Ruck, H. F. Williams	151
THE SULPHUR WATERS OF RICHFIELD SPRINGS, N. Y. Charles C.	
Ransom, M.D	154
DISCUSSION. Drs. R. G. Curtin, Ransom, J. B. Walker, Carl	
Ruedi, Frederick I. Knight	166
A. Jayne, M.D	169
DISCUSSION. Drs. Karl von Ruck, J. H. Tyndale, Edmund J. A.	
Rogers, R. G. Curtin, W. C. Glasgow, W. A. Jayne	175
THE PRE-TUBERCULAR CONDITION. J. Hilgard Tyndale, M.D.	180
THE EPIDEMICS OF INFLUENZA OF 1890 AND 1891 IN CHICAGO.	
E. Fletcher Ingals, M.D	184
	192
REPORT CONCERNING INFLUENZA AS IT OCCURRED IN St. Louis.	
J. C. Mulhall, M.D.	197
INFLUENZA IN NEW YORK. A. A. Smith, M.D	202
Influenza in Savannah. R. J. Nunn, M.D	207
Discussion upon the Reports of the Epidemics of Influ-	
ENZA OCCURRING IN 1890-'91. Drs. James J. Levick, Samuel	
B. Ward, A. A. Smith, Willis E. Ford, John H. Musser, Karl	
von Ruck, S. A. Fisk, Andrew H. Smith, Carl Ruedi, W. W.	
Johnston, W. C. Van Bibber, Frank Fremont-Smith, R. G.	
Curtin, Albert L. Gihon, J. C. Mulhall	209
THE VALUE OF KOCH'S REMEDY EMPLOYED AS AN ALTERATIVE—	
REACTIVE FEVER PREVENTED. Frank Fremont-Smith, M.D.	223
THE DOUBTFUL EFFICACY OF A HOT, DRY CLIMATE IN DISEASE.	
Thos. Darlington, M.D	234
THE SIMULTANEOUS OCCURRENCE OF THREE CASES OF LEPRA IN	
ONE FAMILY. W. H. Geddings, M.D DISCUSSION. Drs. R. G. Curtin and E. O. Otis	238
	243
ON THE CLIMATIC TREATMENT OF CHRONIC DIARRHEA. W. W.	
Johnston, M.D	245
LYMPHATISM. F. H. Bosworth, M.D.	254
DISCUSSION. Drs. Thomas Darlington and A. Jacobi	259
CREASOTE IN PULMONARY DISEASE. Wm. C. Glasgow, M.D. THE INFLUENCE OF HIGH ALTITUDES UPON HEREDITY IN TUBER-	262
CULOSIS AND ITS EFFECTS UPON SOME FORMS OTHER THAN	
	000
Pulmonary. H. B. Moore, M.D	269

## PRESIDENTIAL ADDRESS BEFORE THE AMERICAN CLIMATOLOGICAL ASSOCIATION.

## By FREDERICK I. KNIGHT,

OF BOSTON.

GENTLEMEN OF THE AMERICAN CLIMATOLOGICAL ASSOCIATION:—

It becomes my duty to welcome you to another annual meeting. We meet, alas, not with unbroken numbers, for our roll is shattered by the death of several of our most valued members.

Hosmer A. Johnson, of Chicago; Ethelbert Carroll Morgan, of Washington; Paul Kretzschmar, of Brooklyn; and Joseph Parrish, of Burlington, N. J., have passed away during the year.

Johnson and Kretzschmar were original members of the Association. The former had never taken an active part in our meetings, though last year he sent us a valuable paper. He, however, was known probably to almost every one of the Association, and all who did know him will indorse these words spoken by one of his intimate friends, "Benevolent, magnanimous, cultured, brave, strong, good."

Kretzschmar took an active part in the preliminary meeting in New York, and in nearly all of the meetings of the Association since that time, and was one of our "characters." He was noted for good fellowship and timely good sense in our discussions. It will be long before we forget the portly frame and rubicund visage of Kretzschmar.

Morgan joined the Association at the Baltimore meeting. I do not think he ever took part in any of our discussions. Mortal disease had already laid hold upon him before the meeting following his election, which was held in this city with the last Congress; but those of us who knew him remember the extraordinary will

which bore him up in his persistency to help make our visit to his native city pleasant and successful. The same will upheld him through the tedious years which have followed, and, scholarly and skilful as he was, the tribute which springs first to the lips of every one who knew him is, "He was brave."

Dr. Parrish was elected, I believe, at the Philadelphia meeting, but has never contributed to or been present at any subsequent sessions of the Association.

It is becoming that at our present meeting with the Congress, and in the city where our first regular session was held, we should review our history a little and see how far we have justified our organization.

It needs no special pleading to show that our Association *has* justified its creation. Beginning seven years ago with a programme of six papers, the material offered us has gradually increased from year to year, till to-day a programme of thirty-eight papers is presented of a quality which will challenge comparison with any other organization.

When the Association was founded and the name Climatological adopted it was feared by some that, as the number of members who were in a position to offer anything original pertaining to climatology was so limited, the organization might have a struggling existence.

It was, however, provided from the start that diseases of the respiratory and circulatory organs should be included in the province of the Association, and soon after hydrology was added. What a vast and interesting field this gives us can be seen by a glance at our programme.

Climatology, as was natural, has engaged a good deal of our attention, and last year, for the first time, the suggestion made by me at our first meeting, that we should occasionally hold our session at some noted health-resort, was carried out. As those of you who were not present have already learned from the published report, and as those who were present need not to be reminded, the meeting was well attended, notwithstanding its distant place and the absence from the country of many of our members at the International Congress, was a success in every way, scientifically and socially, and has left a very bright mark

in the memory of all who attended it. Much, in my opinion, can be done for climatology and balneology by meeting at other resorts. This would serve not only to improve our own knowledge of the places, but would also undoubtedly tend to improve the *ménage* of the places themselves. It is said that one hundred million dollars are spent every summer by Americans in Europe. Much of this is spent at watering-places. As far as natural resources are concerned, we can match every spring in Europe; but in the administration, in the use of the waters, external and internal, and in the adjuvants and accessories, we fail.

This is because we are a new country, and we have been hitherto too much engaged in gross development to give much attention to refinements; but, as time goes on, competition will undoubtedly lead to refinement of work, and we shall have as good an administration of our waters and as luxurious accessories as can be found abroad. Already changes are taking place, and at least one establishment offers as good an administration of waters and baths as any in Europe. Others are being improved. This is a great field, and one which will bring large returns to those who will engage in it.

It is not to be expected that all the people, representing the one hundred million dollars spent, will pass their summers in this country, whatever improvements may be made, for Europe has old historic attractions which we cannot rival; but there are many people who, especially after having visited Europe once or twice, would much prefer staying in this country when they can be equally well served.

This I understand to be one of the missions of the American Climatological Association, to promote the knowledge of and the proper administration and use of the climatic and balneological resources with which nature has so abundantly provided us. So far our efforts have been more especially directed to climatology, but we have had several excellent papers on the constitution and use of the waters of American Springs, and we have on our programme for this meeting the announcement of a paper by a gentleman at the head of one of the very best of our establishments. I made efforts to have other practical men to bear witness to their experience, but for various reasons they were unable to

appear. I trust, however, that these gentlemen may come and present their evidence at future sessions of the Association, for they undoubtedly have a vast amount of clinical knowledge which should be imparted to the profession, but which has hitherto, from want of sufficient urging, been kept pretty closely to themselves.

The general sanitation of our health-resorts has been much improved in recent years, in many instances through the exertions of members of this Association; and in the case of most large establishments of the better class it can now be said that the drainage and water-supply are as good as the surroundings will permit.

Not enough, however, has been done to prevent the spread of disease from the sick to the well in these vast aggregations of invalids. Because we cannot do all that we would in control of the invalid's habits, is no reason that we should not do all that we can. Because we can hardly expect the majority of our patients to carry wide-mouthed bottles in their pockets in which to expectorate, as they do at some health resorts abroad, is no reason why there should be no attempt made to restrict that act. Just think in what condition the dust of the streets in some of our crowded resorts must be where the patients are mostly tubercular and expectorate without restraint!

Members of this Association are, most of them, specially interested in the treatment of tubercular patients, and realize the truth of what I say.

Just think of the condition of the patient and his friends at most of our popular resorts! I do not refer to the few sanitaria, but to the hotels where the vast majority of our patients reside at present. Very few of these hotels have been built with reference to the sick. Their rooms are occupied year after year by the tubercular, the sick and the well indifferently crowded together in the "season;" and, in one which has just been described to me by a visitor, a continuous sound of coughing of the most pitiable kind resounded through the halls from three o'clock in the morning till it was time to rise. This was in one of the most fashionable and expensive of the summer resorts. All this suggests not only hygiene of the rooms, and some regulation of the individual, but a more general plan of isolation, a cottage system,

such as the sanitaria already have, for the hotels. Many patients, long since alive to the discomforts of being crowded together in these great caravansaries, now that they have learned also something of the microbic origin of disease, absolutely decline to reside in them. Several times recently I have recommended some wellknown resort on account of the good living and good medical attendance to be obtained there, and my patients have chosen in preference some place in the neighborhood where they thought the climatic conditions would be the same, where the other advantages were unknown, but where they felt they would have pure air and freedom from disagreeable proximity of many invalids. It becomes us, then, and especially those resident at health-resorts, to urge upon landlords improved methods of construction, and also especially such finishing and furnishing of rooms as will permit thorough disinfection, and to insist upon this being done when a room is vacated by an invalid.

Pressure also should be made to bring these establishments, so fully occupied by invalids, more completely under medical control. This concerns the health not only of the invalids, who are certainly worse for breathing bacteria-laden air, but also is perhaps of greater concern to the accompanying relatives, who, though comparatively well, may be predisposed to disease, and who should therefore breathe the purest air possible.

The table at our leading hotels has wonderfully improved in late years, so that one is no longer surprised when a cup of good coffee or a piece of tender meat is set before him; but there is still a sigh of satisfaction when one gets good bread. I cannot refrain from reiterating what I said last year at Denver about the prime necessity of good cooking for the tuberculous patient, nor from again urging the profession to interest itself practically in the establishment of cooking-schools, not to educate our daughters in cooking-finesse, but to educate the every-day cooks, who undertake to prepare our daily food, but who generally know very little about it.

There is a strange lack of cheerfulness about many of our hotelresorts, which we should do all in our power to modify. Music, which is provided at many of them, is usually played indoors, even when the weather is delightful. Although at times there are some drawbacks to an outdoor life in this country, such as the heat of the sun, mosquitoes, etc., much more of it could be provided than is customary. What more conducive to good cheer and good health than "afternoon tea" in the garden with the accompaniment of good music!

As mentioned before, one of the objects of the Association is the study of diseases of the respiratory and circulatory organs. We have had some excellent papers in this field which had no special reference to any climatological relations, and I would call attention to the fact that such papers are especially desired to diversify and intensify the interest in our meetings. There is no association in which such papers would obtain a more intelligent criticism.

Again we meet as a part of the Congress of American Physicians and Surgeons. It will naturally require several experiences of this kind to enable members to determine definitely as to the desirability of the connection. Our Association was decidedly in favor of the Congress at its inception, and, as far as I know the opinion of members, there has been no change of feeling in this regard. The Executive Committee of the Congress has made a decided change in its programme, as compared with that of three years ago, in that it has prolonged the time to be occupied from three to four days, and has taken every afternoon for general sessions, whereas at the last Congress the general meetings were confined to the evening. This may seem to be a good deal of time for the individual organizations to give up, but to do so once in three years will, in my opinion, surely inure to the members' benefit. We ought not to be so bound up in our own domain that we feel no interest in general medicine. On the contrary, we should welcome the opportunity to hear and take part in discussions in the general field, and thus to keep in touch with the progress of the whole science and art of medicine.

In our own domain we have everything to encourage us to activity. In climatology there is not only abundant opportunity for an increase of empirical knowledge, but also great opportunity for exact investigation of the physiological reactions of the human system to variations of atmospheric pressure, moisture, wind, sunlight, etc.

Since, in recent years, the study of physics has entered so largely into preliminary medical study, our young graduates are much better fitted than formerly for grappling with this problem. And while practical climatology will perhaps always remain, like other medical practice, to a great extent empirical, it can be brought to a thoroughly scientific basis. Therefore I do not despair of yet being able to make a differential selection of climate, even for cases of asthma, founded upon the physicial relation of the patient to the surrounding media.

A great deal remains to be done in hydrology; in the first place, in bringing the American medical profession to a belief that there is something more in a natural water than in one compounded by the druggist. In Europe it would probably be hard to find an intelligent physician who believed that a natural water and an artificial water would have precisely the same effect on the human system; in this country one might almost say that it would be difficult to find one who did not so believe.

A few practitioners here have a good knowledge of the empirical use of our natural waters, but this knowledge should be much more generally disseminated.

These two departments, of climatology and hydrology, taken in connection with diseases of the chest, offer to this Association for its cultivation an illimitable field full of variety and interest.

The Association points with pride to what she has already accomplished, and I now turn with confidence to to-day's programme for a pledge of what she will continue to do.

## WHOOPING-COUGH: ITS MANAGEMENT: ITS CLIMATIC TREATMENT.

By J. H. MUSSER, M.D.,

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In the management of whooping-cough we do not embrace, with the degree and vigor paramount to the importance of the case, the conception of the infectious nature of the disease. Such conception should be the fundamental basis upon which our therapeutics should rest. It is true, such means are employed to limit the spread of the disease and thereby prevent the infection of others. It is true, likewise, that such drugs are used as are supposed to limit or control bacillary inflammation. All this is well enough; but the writer holds that sufficient grasp of the fact that the disease is auto-infectious has not been taken, and that the cardinal principles that should obtain under these circumstances are largely held at naught.

Apart from the proof of bacteriological observations, one may see the auto-infection in the general and local phenomena. The constant recurrence from time to time of aggravations of the disease, in spite of measures to prevent "cold," etc., point to reinfection. Moreover, careful study of the inflammatory process in the lung cannot fail to impress one with the mycotic origin of the inflammation. This is particularly seen in the severe cases. An area of the bronchi is infected and the seat of inflammation. Its course is run, an area beyond infected, a decline of the process seen. And so this creeping mycotic inflammation extends from large to small, from small to smaller tubes, extending over a considerable period of time, until the soil liable to infection is exhausted or the patient succumbs to the disease.

With such conception of the nature of whooping-cough our

guidance in its management would be easy if we were certain as to the source of such infection. Does auto-infection take place from the tissues within the body, or does reinfection arise from extraneous conditions, such conditions being due to the affected individual? In other words, is the patient in constant danger of being reinfected from the discharges, such as the abundant expectoration, which have not been properly disposed of? That the former is more than possible, the laws of mycotic inflammation well support. That the latter is likewise possible all principles of infectious diseases uphold. Clinical observations and the results of management conducted in accordance with such ideas confirm the truth that reinfection is the cause of the grave and protracted or relapsing cases of whooping-cough.

In the personal experience of the writer the following occurred:—

A little child, twenty months old, had a severe attack of the disease. Extra measures to remove discharges and insure cleanliness were used. She was removed to the sea-shore. She improved and was brought to her home. She grew worse soon after her return, and in spite of removal a second time to the sea-shore she died. The writer is thoroughly convinced that the return of the patient to the room previously occupied was the cause of her reinfection and ultimate death. Other examples could be cited, and doubtless, to many practitioners, a similar experience has fallen. If it is true that the gravity of whooping-cough is increased tenfold by auto-infection, such measures as may prevent the auto-infection are essential in its successful management. The writer will not again discuss that which has been thrashed out so often, viz., the use of antiseptics introduced through the stomach or by inhalation. While their value may be questioned, this is certain, that change to an aseptic atmosphere, which is stimulating to the general system, is a vantage-point secured far beyond the use of drugs.

The following truths will occur to any one: In the management of whooping-cough it is absolutely essential to apply the principles which are laid down in the control of all infectious diseases. It is not necessary to discuss in detail such common knowledge. In general it may be said, to prevent the infection

of others, quarantine should be insisted upon. The younger members particularly of the family should be protected. All discharges should be disposed of in accordance with antiseptic regulations; all personal clothing and bed-linen should be treated accordingly. The patient's body should be disinfected by baths, etc., daily. The attendants should be disinfected likewise. The room should be furnished as we are wont to do in cases of scarlatina. If possible, frequent changes to another room should be made, the room just occupied being thoroughly disinfected in the interim. No doubt the value of the treatment by sulphur fumigation of the sleeping-rooms, as advised by many writers, arises because of the disinfection secured. Other measures will occur to the practitioner. The above simply points the way; the details of antiseptic management must be carried on in all cases.

The Climatic Treatment.—In a few words the climatic treatment was alluded to above. All agree that cases which develop in our cities are benefited by change. Removal to the sea-shore or the country is generally followed by an amelioration of all symptoms. It is not necessary to discuss the benefit of such treatment. We all recognize its utility. It is of vital importance to discuss its practical possibilities. All recognize the difficulties that arise. refuse patients with the disease; private houses take them only on the fullest recompense. A certain class are debarred from climatic treatment by the expense attending it. Any one who has tried to get patients to suitable places will appreciate the difficulties and discomforts to himself and his patients. It is with the hope that the members of this society can now, or in the future, suggest and have established systematic means by which, to most persons, climatic treatment may be possible, and can be secured with a certain amount of comfort at a reasonable degree of cost, that the writer has ventured to bring up this homely but practical topic.

Is it worth while for this society to appoint a committee which might investigate the question involved and attempt to devise means whereby the benefits of climatic change could be secured to most of our patients?

Could a central bureau of registration or a directory be devised which at once could furnish all desirable information concerning health resorts and their accommodations for infectious diseases? This bureau need not be general. Each community might have one for resorts in its vicinity as each large town has a nurse's directory. Could and should this society attempt to get the authorities of properly selected points to build or encourage the building of sanitariums for the treatment of whooping-cough?

With a full appreciation of the practical importance of the subject, the writer submits the above for consideration,

## MEDICAL TREATMENT OF PLEURISY.

By G. M. GARLAND, M.D.,
BOSTON.

In response to a request from our Chairman, I agreed to open the discussion upon pleurisy by a paper on the medical treatment of that disease. I have nothing new to advance upon this topic, nor do I know of any novelties of recent origin. It is often useful, however, simply to review our limitations in the hope that such definition may reveal further opportunities for advance.

The great and burning question of to-day is in regard to the tubercular affinities of serous pleuritic effusions. Are all such effusions tubercular in origin? Do attacks of pleurisy augur a greater liability to subsequent tuberculosis?

Both of these questions have been hotly contested during the last few years, but unfortunately no definite decision has yet been reached. Some effusions, upon test, have revealed a flotilla of tubercle germs; others have apparently contained no germs.

Landouzy reports a large percentage of cases in persons who have subsequently died of tuberculosis. Coriveaud has followed up twenty-seven cases of sero-fibrinous pleurisy for periods of twenty-five, twenty, sixteen, eleven, ten, and eight years, and none of them became tubercular. Bowditch's results favor Coriveaud's conclusions.

My own experience is probably exceptional, but 50 per cent. of the cases of sero-fibrinous pleurisy, seen by me in private practice and in consultation during the past fifteen years, are to-day dead or dying of tuberculosis. Eighty per cent. of these cases of subsequent tuberculosis required tapping before the effusion disappeared. None of them were old, neglected pleurisies, and all were tapped and relieved of the effusion within a reasonable time.

Some of them enjoyed apparently good health after the pleurisy and before the tubercular development which terminated their lives.

Since writing the above, I have seen the following statistics of Dr. Barrs, who thinks "that there is a close association between pleuritic effusions and tuberculous changes in the body. Of seventy-four cases of pleurisy with effusion, under treatment in hospital between the years 1880–84, thirty-two are dead, twenty-five are living, and seventeen could not be traced—that is, there had been a death-rate in the cases which could be traced of something like 57 per cent. In the thirty-two fatal cases the average age of the patients was thirty-two and a half years, the maximum being fifty-four and the minimum three. As to the duration of life after the onset of the disease, there died in hospital three; died the day after leaving hospital one. In the remaining twenty-eight cases the average duration of life was two and a half years, the maximum being five years and the minimum six months. The causes of death in the thirty-two cases were as follows:—

Known phthisis	•							14
Probable phthisis								1
Hip-disease .								1
Tubercular mening	gitis							1
Acute tuberculosis								1
'Pleurisy' .								3
'Dropsy' .								2
'Hydropericardium	n'				•			1
Unascertained cau	ses							8
m . 1								
Total .	•	•	•	•	•	•	•	32

"So that twenty-one cases out of thirty-two died of the disease 'pleurisy,' or some recognized tuberculous condition, mainly phthisis pulmonalis."

The therapeutic indications in the early stages of pleurisy are usually simple and sharply defined; cough, pain, and fever are the usual discomforts. To allay the cough, I have been best satisfied with small doses of morphine (gr.  $\frac{1}{100} - \frac{1}{50}$ ) repeated every hour. It seems to me that such doses soothe the cough better and with less general disturbance than larger doses repeated at longer intervals. Such doses do not much affect the

pleuritic pain, however, and for this I employ hot poultices made after Brunton's rule. Take a piece of old flannel and make a bag of required size with a sufficient flap on one side. Pour into it the poultice steaming from the fire, and stitch down the flap and apply. A poultice with a muslin face must first be cooled by waving in the air and blowing, but a flannel bag poultice can usually be applied immediately, and thus the full benefit of the heat obtained. So far as my experience goes, a poultice is of benefit only during the hot and painful stage of the inflammation of a serous membrane. Later, when an effusion has formed, and the question of absorption arises, poultices are useless and a burden, and the patients express themselves as conscious of this fact. I think the poultices and morphine, by allaying local and general irritability, tend somewhat to abate the febrile movement. As a rule, however, pleuritic fever does not fly high. I have never, therefore, considered antipyretics as indicated in this affection. Moreover, as antipyretics are all cardiac depressants, I think the patient is safer without them in a disease which is notoriously dangerous by its tendency to cardiac exhaustion. I sometimes employ gelsemium for headache and restlessness, and this is practically the limit of my medication of the early stage. As soon as an effusion forms, it becomes a poultice itself and pain usually ceases, though the cough may increase in frequency.

To relieve pain, Otto, of Dorpat, advises bandages around the entire thorax at the level of the pain. He prefers cotton to elastic bands. He commences in the axillary line of the sound side and passes two overlapping rows tightly around the chest. At first the patient experiences constriction, but in a few moments he accommodates himself to the pressure, and finds that he can breathe much more easily and even more deeply than before by reason of the cessation of the stitch. Otto says only one patient insisted on the removal of the bandage, but subsequent pain led him to beg for its replacement.

Drzewioski extols salicylic acid and salol in pleurisy, on the ground that this is a rheumatic affection, and he thinks that he has obtained very satisfactory results with these drugs.

When an effusion has fully formed, there arises the question of its disposal. Nature, when left to herself, exhibits two ways of inducing rapid removal of the fluid; by hyperhydrosis and purgation. Acting upon this hint, Dr. Hay, of Scotland, devised the so-called "dry treatment." Absorption is essentially an osmosis, and the conditions which favor that process in a glass vessel will likewise favor it in the human chest. If one can abstract water from the blood and thereby increase its density, he will also render its absorbing power greater. Hay's method consists simply in diminishing, as much as possible, the amount of fluids taken into the stomach, and increasing the amount of water in the evacuations. He recommends the free use of salts in the morning to induce watery stools, which, combined with limited drinks, soon puts the blood in a condition for absorbing. This method is not only good in theory, but it works. I have employed it in a number of cases with highly gratifying results. I shall cite one case which was, perhaps, the most striking:—

Mrs. L., 22 years old, was first seen by me on July 4th. She then had had a cough, fever, and a severe pain in her side for a few hours, but there was no sign of any effusion. On July 8th, I found evidences of fluid in the pleural cavity. This fluid accumulated until it reached the third intercostal space in front, where it attained its maximum. The fever and other symptoms gradually abated, but the effusion remained stationary until July 24th, when I began the dry treatment. On July 27th, I could no longer find any evidence of fluid in the chest.

In one way this treatment is difficult to carry out, because it involves no slight amount of discomfort to the patient. Such patients, weak and fretful from illness, are not always amenable to reason when harassed by a steadily increasing thirst. For this reason, I think it wise not to begin the thirst ordeal too early in the case. After the effusion has entirely formed, and the inflammation of the pleura has largely subsided, one can hope for good results with an intelligent patient who has the nerve and hopefulness to endure a few days' additional discomfort.

Instead of salts I have employed Seidlitz powders as more palatable, and the amount of saline given must, of course, be according to the individual requirements and strength of the patient.

As an exhibition of the power of hyperhydrosis to produce

absorption, I cite the following case: In May, 1890, I had a patient in my care, suffering from ulcerative endocarditis. The disease focus was apparently situated somewhere in the right chambers of the heart, because the embolic explosions, which occurred about once a week, were limited to the pulmonary district. Among other disasters produced thereby was a large pleuritic effusion on the right side. It had lasted several days and reached as high as the fourth rib in front. The presence of the fluid was verified by Dr. David W. Cheever and myself, and we were deliberating upon the necessity for tapping, on account of impeded respiration. The effusion was then of full size on Wednesday. On Friday morning, when Dr. Cheever and I met in consultation, to tap if necessary, no fluid could be found in the Meanwhile the man had sweat as I have never seen a person sweat before. Throughout his illness, sweating with and without chills had been a prominent feature, and at the period mentioned the sweating had been so excessive and constant, and the consequent changing of his bedclothing and shirts had become so burdensome to him, that we allowed him to lie naked in bed with loose blankets wrapped about him. Two able-bodied nurses and the patient's mother took turns by day and night in wiping his body and removing wet blankets. During one night, between 7 P. M. and 7 A. M., eighteen blankets were wrapped about him and then removed thoroughly wet, and this in addition to frequent and vigorous wipings with towels. I may add that this sweating, somewhat modified, kept up till death, and the patient lay wrapped in blankets, without shirts, for about six weeks.

As the result of this profuse sweating, an effusion reaching to the fourth rib was entirely absorbed in about forty-eight hours. At the time when this occurred, I saw the report of a similar case of ulcerative endocarditis, with profuse sweating and phenomenally rapid absorption of a pleuritic effusion, which occurred in the practice of Dr. A. L. Loomis, of New York, and was published by him.

In regard to tapping, I am not so radical as many writers. I am to-day addressing a body of skilful and experienced physicians, but I am discussing a topic of great importance to the novice, and therefore I say that I do not consider it safe or wise teaching to

instruct young physicians to puncture every chest that contains signs of fluid after a few days' illness. Such advice I have seen given, but I have found no statistics which exhibit better results by such methods than are obtainable by more conservative treatment. Moreover, the reputation of a too ready resort to aggressive therapeutical measures is not an enviable one for a young practitioner. Again, it is not merely a pleuritic effusion which is the assailable point, but it is a living, sentient being with all his environment which must enter into the problem of treatment. I therefore maintain that mild measures should first be thoroughly tried and proved to be futile before paracentesis is decided upon in all cases of small or moderate effusions, and one should always wait until the flurry of the initial inflammation has subsided.

I say that I recommend conservative measures with small or moderate effusions, but beyond this there are two indications which should take precedence of everything else, and these are:—

- 1. An excessive amount of fluid in the chest.
- 2. Stress symptoms in breathing or in the action of the heart.

If an effusion extend above the third rib in front, I call it excessive and an indication for tapping. Should stress symptoms, such as difficult breathing, cyanosis, a lump in the throat, etc., be also present, then not a moment should be lost, as death may occur at any instant, and a physician who hesitates to tap under these circumstances is morally responsible for an unnecessary death should such issue unfortunately occur.

Now and then a case presents itself with conspicuous stress symptoms and only a *small* amount of effusion. In such cases one should proceed cautiously, because the stress is probably due to a coincident heart-disease rather than to the presence of the fluid, and, while tapping may benefit, the operation is not unattended by danger.

The following case impressed this fact upon me: In June, 1890, I one day found a man, 64 years of age, in my office, exhibiting great distress of breathing. He was noticeably cyanotic, and talked in short, jerky sentences. On examination I discovered a moderate effusion in the left side, not reaching above the fourth rib. Later in the day I tapped him as he lay half-reclining in bed. After removing about a quart of fluid, I

noticed that the patient became excessively eyanotic and troubled for breath. I removed the needle and applied stimulants, but I thought the man would never rally. Finally he grew easier, but for several days he was unable to rise in bed without a modified attack of the same kind. After a few weeks he returned to his home in the West much improved in strength and wind, but with marked dulness on the affected side. In the following October his physicians at home deemed it advisable to tap him again. As they inserted the needle he dropped dead. The stress symptoms in this case were evidently due to other causes than the effusion, though undoubtedly aggravated thereby.

Another condition of pleurisy may occur. A patient comes with a moderate effusion of long standing. Ought one to tap immediately? Such cases are sometimes still amenable to less radical measures. I recently saw a man who had a moderate pleuritic effusion on the right side, combined with general anasarca from cardiac and renal troubles. The history of the case revealed the fact that the illness began last November with the pleurisy, some time before the general dropsy developed. I wanted to tap the chest, but yielded to the desire of the friends to try other measures first. I gave the infusion of digitalis and acetate of potash. The urine increased quickly from about thirty ounces to ninety and one hundred ounces per day, and the effusion absorbed so rapidly that a stitch recurred in the side as the inflamed surfaces began to creak over each other once more:

The causes of sudden death with large effusions are no doubt multiple. Weil concludes that such deaths may occur by thrombosis or embolism of heart or pulmonary artery; by ædema of the opposite lung; by degeneration of the myocardium. Such causes as syncope, displacement of the heart, torsion of the great vessels, and hypothetical lesions, like multiple cerebral embolism, may be provisionally accepted, but they require further investigation. Weil also states that sudden death occurs oftener in right than in left pleurisies, and that it may come without any premonitions.

Why the heart-muscle should be so prone to degenerate in pleurisy is an interesting topic, but one which I have never seen discussed. The phenomenon appears to rank with certain other trophic changes of pleurisy and its kindred affections. It is a recognized fact that an inflammation of any serous membrane is liable to produce atrophy of muscles in its immediate neighborhood. I have seen a gonorrheal synovitis of both knee-joints produce such excessive atrophy of the thigh muscles that the patient could hardly lift his feet from the floor, and he was many weeks in regaining the power to walk without a cane. Pleurisy is said similarly to affect the muscles on the same side of the chest. Possibly a like trophic influence may be exerted upon the heart.

### NOTES ON GENERAL versus LOCAL TREATMENT OF CATARRHAL INFLAMMATIONS OF THE UPPER AIR-TRACT.

By BEVERLEY ROBINSON, M.D., NEW YORK.

One of the constantly recurring topics of discussion between the general practitioner and the specialist is the relative importance of general and local treatment of catarrhal inflammations of the upper air-tract. This depends, no doubt, in great part, upon the differences in the field of their observation. Thus the general practitioner regards the body as a whole made up of very numerous parts. In the diseases of any particular organ he is prone to trace the relations which exist between them and sufferings elsewhere, and to remark that very frequently it is only in proportion as some, more or less remote, organ is favorably modified as to its structural or functional disturbance that the disease, for which advice is sought, is benefited or cured. True, the specialist will say that he makes similar researches to those of the general practitioner as far as he is able; and, when at fault, seeks other and, as he believes, helpful advice. But is it possible for him to do so in all cases, and even if he could, would his final judgment of what it is best to do for the patient be as good as if the latter had in the beginning the broader advice and treatment of a general physician? These and many other questions of a similar kind have been presented and answered, as we all know, in opposite manners from the time specialism first showed its real strength. In the relations which specialism bears to the treatment of inflammatory diseases of the upper air-tract, it is often difficult to determine to what extent her influence has been useful. At the present time if any one who is thoroughly conversant with general medicine raises his voice before an assembly

of throat and nose specialists in favor of many time-honored views, such as the importance of diathesis in the causation of these affections, their relations with errors of diet, habit, or mode of life; their dependence upon malaria, syphilis, or tuberculosis, it is scarcely too much to say that such views are often shown to be unpopular and antiquated by the manner in which they are received. A few, it may be, of those present are willing to acknowledge that there is more than a grain of truth in opinions thus expressed; but the majority shakes its head negatively and merely considers the writer, or teller of the story, as a benighted person of a past era.

The reverse of the picture is, however, also true and not seldom encountered. And here I mean those very conservative practitioners who still regard the knowledge acquired by the laryngologist and rhinologist as of very doubtful value, and who no more believe in the untold ills occasioned by hypertrophy of the turbinated bodies, or a deviation of the septum, than they do in anything else that to them is somewhat mythical. I believe, and I always have believed, that the true position is held, and only can be held by the general practitioner, who has sufficient special training to allow him to be fully appreciative of what is being done properly in that line, but who is in daily contact, also, with the multiform diseases of the human economy in almost every organ.

On the latter ground, which I regard as terra firma, figuratively, I have long stood. Each year, as it passes, more thoroughly convinces me of the soundness of my views.

To pass from these general remarks to the study of our subject, I would begin by asking, What does it profit a man's nose to be sawed, gouged, or trephined, because the pituitary membrane is inflamed? Does it improve more rapidly than if the old methods of inhaling, spraying, and douching were continued? To these queries, of course, no general answer can be given which does not, of necessity, carry with it numerous exceptions. After all, however, it is useful to point out certain rules of guidance which shall enable us to practise intelligently, and to do what is sensible with the various special cases as they arise.

I am of the opinion that in instances of marked obstructive

disease of the nasal passages due to the presence of mucous polyps, or a bony or cartilaginous overgrowth of tissue, that freedom should be given to nasal respiration by means of suitable operative interference, provided always that the obstruction is wholly dependant upon one or other of these conditions. When, however, the obstruction is only of such a character as to be really objectionable when inflammatory disease of the mucous membrane of the nasal passages is, so to speak, grafted upon, or attached to it, the problem is not so easily solved. A large proportion of adult persons have more or less obstruction of one or the other nasal passages in a certain sense. I mean by this that one nasal passage is less free than the other.

This can be readily determined by those present in pressing gently upon one naris, and then breathing in and out through the other nasal passage. When they have tested one nasal passage in this manner, let them reverse the process by pressing on the other naris and drawing the air with each inspiration into the nasal passage, which was at first closed, with the finger. The statement which I have just made, and which has been repeated by me on several occasions, proves conclusively to my mind, that we must not expect all adults to breathe equally well through both nasal passages. Are such persons to be considered in an abnormal or unhealthy condition and requiring operative interference? My anwer is: If the obstruction be permanent, and evidently causes disease in adjacent organs, as the eye, ear, or larvnx; or if the patient be visibly annoyed, or distressed by the existing condition, it should be removed. If, however, the obstruction be only occasionally objectionable, and at such times depends upon the swelling and engorgement of the pituitary membrane, then some suitable local applications are all that is required, unless the constitutional condition, or the condition of some organ be such that we find the indications for general treatment. If local applications alone be required, it is, of course, very important to make those that are beneficial. And here it is that the wisdom of the practitioner is essential. If the lining membrane of the nose be already acutely or chronically inflamed, we must not increase these conditions. It will not do, for example, to try warm inhalations, or warm sprays, upon an inflammatory condition of a few

hours' standing, and afterwards allow the patient to go into the open air. Especially is this true, if there be any febrile movement in connection with the inflammatory process.

Again, whilst there is a small proportion of patients who obviously get a measure of relief, usually temporary, from the use of the nasal douche, yet this means of treatment has been shown to occasion additional obstruction of the nasal passages in very many cases. Not infrequently, even when certain precautionary measures have been adopted, the ears have become acutely inflamed, and gone on to suppuration, following its use. Applications in the form of spray of a soothing and protective coating like that of vaseline, or cosmoline oil (or the proprietary distillations called variously albolene, benzoïno, glymol, etc.) have a great advantage in that they do no harm, and often ameliorate the unpleasant symptoms from which the patient suffers.

Although this statement is undoubtedly true, I have always present to my mind the fact, that with an engorged liver and portal system, unless a few repeated moderate doses of salts be given, the nasal obstruction will often continue most obstinate and rebellious. A passing bilious attack, with coated, broad, flabby, indented tongue, coppery taste in the mouth, slight nausca, belching of wind, tenderness on pressure over the epigastrium, torpid or relaxed bowels, will often be the forerunner or accompaniment of nasal inflammation producing obstruction, which will only yield definitely to abstemious living and the use of appropriate alkaline remedies. These attacks may be infrequent or frequent, depending much upon the habits and constitutional tendencies of the patient. After many such attacks the liver has slight permanent enlargement, and the stomach fixed catarrhal inflammation. When this is the case we shall often find chronic hypertrophy of the turbinated bodies, doubtless occasioned by frequent recurrent inflammations, and which can only be reduced to a condition permitting free nasal respiration by one or more cauterizations with acid or electro-cautery. And here I would direct attention to the fact of the very great relief afforded to the patient in this manner. Patients who, previous to the cauterization, had been uncomfortable during the day, and sometimes almost sleepless during the night, owing to their absolute inability to get

air through their nasal passages, are restored to peace and tranquillity in a few days, or even twenty-four hours, by an innocuous operation in the great majority of cases. To any one who has witnessed the great discomfort, or even absolute suffering, of an individual who has pronounced nasal obstruction, caused in part by thickening of the nasal mucous membrane, and aggravated by an acute inflammatory attack, the amount of positive relief afforded by this local interference is a source of great satisfaction, and, if seen for the first time, of genuine wonder. Whilst entire relief may frequently be afforded by one or more simple cauterizations, there are times where more positive action still is required on account of a thickened, or deviated septum. In these instances we must make use of Jarvis's or Weir's forceps, the nasal saw, or the nasal trephine. Here I would, however, throw out a warning note, that these instruments should be used only when really required, as their employment makes a raw surface which requires time and care to heal entirely, and in rare instances leaves an ulceration or scarred area, which causes long-continued pain and irritation. Usually speaking, however, the operative procedures on thickened turbinated bodies, or a deviated or thickened septum in a nose in which the condition inside is markedly hypertrophic, are not followed by unpleasant sequelæ nearly so often as when the inflammatory condition takes on an atrophic character. There is, however, a wide-spread belief, not only amongst general practitioners, but also amongst specialists, that the hypertrophic variety of rhinitis, with considerable occlusion of the nasal passages, is the form of disease which occasions most of the distressing symptoms connected with adjacent organs, as the eyes, ears, tonsils, pharynx, larynx, and bronchi.

In my belief, this is not true, for several reasons. In the first place, when nasal obstruction becomes very pronounced, it is usually so distressing that the patient demands local interference, and this latter occurs usually before serious complications arise. Besides, so soon as the nasal passages are freed by cauterization, or other operative procedure, the relief afforded to the patient is, as a rule, rapid and evident. Finally, to repeat myself, the complications of an obstructed nose are not so considerable or frequent as one is led to infer by reading late periodical literature on

this subject. Of course, suppurative otitis, sunken drum membranes, ankylosed ossieles, chronic conjunctivitis, hay fever, or bronchitic asthma, may all be occasioned by occluded nasal passages.

It is well to remember, however, that the worst forms of these troubles are usually found in patients who have free nasal respiration, and are unmindful, to a great degree, of their intra-nasal condition until their attention is directed to it by the specialist as the cause, or concomitant condition, of disease in adjacent organs. The relatively free nasal passages with dry irritable membrane, somewhat glazed surface and obvious thinning of the membrane itself, whilst the vessels often bleed profusely from the slightest irritation, are the cases which I dread the most, so difficult do I find it to improve or wholly relieve this condition. Here, again, the question comes up, How must we treat these cases, locally or generally, or by a happy combination of both kinds of treatment? In these instances, all harsh local measures should be absolutely avoided. In some of them I have found that cauterizations, especially with the electro-cautery, have healed with great difficulty. Indeed, on one occasion that I recall with considerable regret, although fortunately I was not the operator, I doubt very much if the ulceration ever got entirely well. There seems to be so little vitality in the tissues that they are unable to recover from any loss of substance, except with the greatest care and attention on the part of the physician.

In the way of local remedies of very many kinds that I have tried in the form of inhalations, sprays, and powders, there are none which have been of very great value in establishing a cure. I am of the opinion, however, that mild carbolized ointments, applied upon cotton-wrapped probes, have been most useful in relieving the dryness and irritability of the nasal mucous membrane.

In those individuals particularly, in whom the tendency to the formation of crusts and scabs is most pronounced, there is nothing so beneficial locally as keeping the surfaces constantly coated with an ointment, the base of which is vaseline or oil. Goulard's cerate is one of my favorite remedies, when it is freshly made and

when the crusts are attached to the septum near the nares. Indeed, whenever these crusts are intimately adherent to an ulceration of the septum at this level, and are related to it either as a cause or a result. I have found latterly that I have obtained as good or better results by keeping the crusts and underlying mucous membrane thoroughly lubricated with an ointment, as by occasional applications of any astringent or caustic fluid. The saturated solution of the sulphate of copper was formerly much used by me in these cases, but during the past two years, especially with my patients who will carry out my instructions carefully, I rarely employ this application. Inasmuch as I find a diathetic condition present in many instances, notably rheumatism or gout, I have sent such patients to Sharon or Richfield, during the summer, and during the winter I find judicious alkaline treatment, with or without the addition of colchicum, as the most beneficial I can institute. Indeed, without this general medication, I find that local treatment has comparatively little value. Take, for example, those too frequent cases of atrophic catarrhal inflammations of the nasal and naso-pharyngeal mucous membrane, which ultimately produce such regrettable results in causing chronic dry proliferative aural catarrh. The sunken drumheads and ankylosed ossicles are, in these instances, as we all know, the anatomical factors connected with greatly impaired hearing and tinnitus aurium of a sort to relieve which anything done locally, short of removal of the membrane and ossicles themselves, seems wholly powerless.

Whilst I cannot claim from any general treatment to have cured these conditions when they were far advanced, or when the tinnitus had become a constant symptom in the disease, I am quite sure that I have prevented the local stage more than once from reaching that state in which life itself is at times almost unendurable from unceasing noises in the head. This surely is no small thing accomplished, if we once realize how many bright intellects have gone to waste, and how many times the happiness of a household has been destroyed by an affliction which the aurist alone claims to treat, and which, I believe, properly understood, may surely be helped by the timely intervention of the general practitioner.

I know a lady in middle life, formerly a patient of mine, who was a constant subject for eye, ear, and throat treatment during several years, who now allows these organs to remain unmolested because she does not suffer with them, and because she has been greatly improved in general health by strictly carrying out treatment suitable to her rheumatic dyscrasia.

I had a young lawyer friend and relative under my care some years ago, who has since died, after a too brief and brilliant career, who was more relieved of the distressing symptoms connected with chronic aural catarrh by two seasons at Aix-Les-Bains than he ever was by the continuous treatment of different distinguished aurists and laryngologists in America and Europe.

Such examples have made a lasting impression on me, and with a broader and larger experience I feel competent to give them their full value and to translate their bearings to those before whom I have the pleasure and honor of reading this paper.

There is a most obstinate form of cough occasionally explained by hysteria, anæmia, a disordered stomach, fibroid changes in the lungs, puberty (as Sir Andrew Clarke would have us believe), which, I am sure, is simply dependent upon an enlarged lingual tonsil.

Try all kinds of general treatment that you may, give change of air and habits, tone up the system by every sort of corroborant, and sometimes such a cough will defeat all your best directed efforts. Local treatment judiciously employed, will alone at times relieve persons thus affected.

Such a case was under my care for several weeks last winter at St. Luke's Hospital, New York City. The patient was a young woman, single, and somewhat anemic, and presumed to be hysterical. From these standpoints all rational treatment was tried until it was proven to be utterly futile. The patient was then placed in my charge. Upon examination I found she had a very much enlarged lingual tonsil which pressed upon the anterior surface of the epiglottis and lapped over a portion of its free margin.

Active cauterization with the electro-cautery repeated several times at intervals of a few days, reduced materially the size of the tonsil and relieved the cough entirely. I would not have my hearers believe, however, that all enlargements of the lingual tonsil can be thus cured. On the contrary in some cases that I have seen even after very thorough cauterizations the tonsil has remained undiminished as to its increased size, or else it has been smaller for a time and afterwards has become, more or less rapidly, quite as large as it was at the beginning of local treatment.

Finding this to be true, I have naturally searched for the cause. In some instances I have found the profession at fault, or, rather, the use of the voice adjoined to a profession which is especially trying to the vocal powers. In more than one instance the vocation was that of a nurse, in another a preacher, in a third a broker.

Occasionally the profession itself did not seem unfavorable until upon close questioning, the patient showed that from necessity he, or she, was forced to make immoderate, or injudicious, use of the voice. This bad habit was frequently allied to a general condition decidedly poor in which anemia and lowered nervenutrition were clearly integral factors in the case. Of course the treatment in these examples was directed as far as could be to the correction of the evident great defects in the mode of life.

Occasionally I have discovered that an underlying rheumatic dyscrasia was alone at fault, and so evident has this been-notably in one of my cases reported in the New York Medical Record, last winter, that every time the joints became more or less painful the throat was relieved and the lingual tonsil was visibly smaller in size and less angry looking. In a patient under my care at the present time, a bachelor forty years of age, of excellent general health, with, however, a rare outbreak of lithæmia, owing to too rich diet, there have been at various times marked symptoms of throat irritation due obviously to the presence of an enlarged lingual tonsil. More than once the most annoying symptom was that of a recurrent, obstinate, paroxysmal cough with little expectoration of phlegm. In fact there were scarcely any sputa at all, but merely an unpleasant feeling of dryness localized at the base of the tongue, and the occasional raising of a small pellet of inspissated mucus. This dryness could be quite effectually soothed for a while by applications of carbolic acid and glycerine (fifteen grains to the ounce). Unfortunately, this sensation soon returned, and nothing I could do would entirely relieve it. After a somewhat prolonged hot spell, with a close, muggy atmosphere, my patient had a very distressing attack of facial eczema. No sooner had the eruption fairly appeared around the angles of the mouth, and on the skin of the upper lip, than all the throat symptoms disappeared, and the patient had no longer any of the throat disturbances to which I referred a moment ago. Occasionally the phenomena are different from those already described, and the sensation of a foreign body constantly in the throat, with that of a band constricting it more or less tightly, is what the patient complains of. Every effort of swallowing is painful and difficult, and at night the choking feelings are such that these patients are either prevented from going to sleep, or if they do sleep for a few hours, they awaken with a start and in a state of terror difficult to control. Their breathing is obviously obstructed, their face congested, and large drops of perspiration stand out as beads upon the forehead, thus betraving their anxiety and physical distress. Steam inhalations impregnated with turpentine, or benzoin vapors will relieve such cases when nothing else will. Beware of attributing them to the existence of spasmodic asthma, or to that sort of dyspnea and dread caused by a chronically diseased and laboring heart. Last spring I had under my care a young lady sent to me from the New York Hospital, who had gone without solid food during six weeks for fear lest she should choke to death if she made an attempt to swallow anything of firm, or semi-solid consistence. All my persuasive efforts, all my simulated severity remained without effect for many weeks, and my patient grew weaker daily, and was the source of much solicitude to her family and friends. It is true that in this case there was a marked nervous element present, and vet antispasmodic drugs, although thoroughly tried, were not of the slightest benefit. The lingual tonsil itself was notably enlarged, and at one time lapped over the free border of the epiglottis in such a way as to considerably interfere with the movement of this organ during deglutition.

I burned away this portion of the tonsil with the galvanocautery, and hoped thus to give relief to my patient. Unfortu-

nately I failed in my endeavor, and it was finally determined to try what vigorous outdoor exercise, especially riding on horseback, more attractive surroundings, and complete abandonment of local treatment, would do for her. The result is not at present known to me. I am of the opinion, however, in view of this and other instances of an analogous character met with, that many cases of so-called "globus hystericus," are unquestionably dependent upon the presence of the enlarged lingual tonsil. I am not at all sure that all these cases will be cured, or even benefited by rational local treatment. I am persuaded, however, that some sufferers must be thus treated in order to effect a cure. In view of these statements it should also be urged that in hysterical girls not only should we examine the condition of the throat to see if the lingual tonsil be enlarged, but also inquire closely into the condition of the uterus and its function. An anteverted or retroverted uterus with profuse or painful menstrual periods, is often, as we know, the source and pabulum, so to speak, of the hysterical and anæmic condition, and, incidentally, such conditions are likewise efficient factors in producing enlargement of the lingual tonsil. I think all present will therefore agree with me, that a wise specialism makes one extremely conservative and loth to interfere unduly, either medically or surgically, with apparent abnormal states of one organ, before the other organs and the general system have been brought under the closest scrutiny. As I become older, and I trust better versed in the practice of medicine, nothing fills me with more wholesome regrets than the knowledge of the large numbers of persons who are victims of well meaning, but also very narrow and ignorant advice and doing.

If the patients of these blind men fell into the ditch together with their counsellors there might be some slight compensation to intelligent observers, but when the former alone are the sufferers in having their pockets depleted and their bodies made more ailing, there is in truth no equivalent, ever so small, to be found. In some of the instances of enlarged lingual tonsils, we shall notice that the faucial tonsils are also increased in size, and there is more or less adenoid hypertrophy at the vault of the pharynx. In more numerous cases the fauces, pharynx, palate, and even the faucial tonsils themselves are in relatively very good condition, and unless

we make use of the laryngeal mirror, or attach absolute credence to the symptoms referred to already, we should be prone to be skeptical as to the existence of the enlarged lingual tonsil. One glance, however, into the large reflecting larvngeal mirror is enough to do away immediately with all our doubts, as we shall see the glosso-epiglottic fossæ wholly filled up with a large mass of adenoid tissue where normally, as we know, there are two quite considerable excavations. One of the errors of the day, as I believe, on the part of some of the throat specialists, even the most eminent, is to attribute too great importance to the nasal organ as a cause of larvngeal inflammations. This is so true. that at least one of the physicians to whom I refer appears to believe that we may safely ignore much treatment, either local or general, directed to the larynx, and that by sawing off any projections which may exist from the nasal septum the larynx will right itself, the hoarse voice will become pure again, and painful deglutition an unconscious act.

Speaking in this connection Bosworth writes as follows (Trans. Am. Clim. Assoc., 1884, p. 67): "Chronic catarrhal laryngitis, then, I believe to be really a symptom rather than a disease. It is one of the results and accompaniments of catarrhal inflammation of the nasal mucous membrane, rather than a morbid process commencing in the laryngeal cavity;" and upon page 68 he writes: "In the past three years I do not recall a single case of chronic laryngitis which has not been cured. During this period I have entirely abandoned all local applications to the larynx, and have treated the nasal disorder which I have found to be present in every case."

I cannot share such views and mainly for the reason that I see too many acute and subacute cases of laryngeal inflammation, in which this condition is the essential disease from which the patient suffers, and upon which all his painful symptoms depend.

If we treat these patients solely with general remedies, we obtain, usually, poor and slow results. They must be treated locally, and after a large experience I am confident that astringent applications and soothing sprays, notably of carbolic acid and the bicarbonate of soda, are most beneficial. Occasionally, however, both local and general treatment of the most rational

kind will prove to be wholly ineffective and the patient will continue to cough and expectorate indefinitely, or until we give him a radical change of air. If he be at the sea-shore, send him to the mountains; if he be in the interior where the air is dry, elevated, and bracing, let him have the moist and more soothing atmosphere of a healthful resort upon the coast. If he be in a large city or town, transport him into a more salubrious environment such as either mountain or sea-air afford.

With respect to change of locality, there is one consideration which should be borne in mind, that is the fact of the presence of malarial germs in many places in this country. If unfortunately our patient be already a sufferer from miasmatic poisoning, he will be more surely benefited, as a rule, by judicious antimalarial medication, so far as the inflammation of his upper airpassages is concerned, than by any mere change of climate. There are, however, exceptions to this law, and I have occasionally known patients in whom medicines had become of very little service, where a change caused very rapid and marked amelioration of their condition. If our patient, thus affected, go to another malarial place, he will derive no benefit whatever from change. If he go to a relaxing sea-side resort, even if it be wholly free from malaria, he will not surely get rid of his catarrh, his cough, or his general throat irritation. I have been witness too frequently, during the past ten or twelve years, of instances in which patients have gone to the sea-shore with the anticipation of being thus benefited, and who have returned home much disappointed at a different result, not to attach great importance to my statement. I am not sure that sea-side places do ultimate harm to malarial patients. I am confident, however, that they bring out more prominently certain malarial manifestations, which previously had been latent or ignored. Among these symptoms those pertaining to the nasal passages and throat were particularly harassing. During the past summer at Newport, Rhode Island, important facts relating to this subject have become indelibly stamped in my mind. Thanks to the learned and courteous cooperation of my friend Dr. Siegfried, surgeon in the United States Navy, I have been able to observe in several cases hæmatazöön malariæ of different and interesting forms in the blood of those who had other and different ailments it is true, but who, also, were constant, or periodical sufferers from catarrh, pharyngitis, laryngitis, or some form of catarrhal inflammation of the upper air-tract.

One subject which has been of very great interest to a large number of accurate and painstaking clinical observers has been that of the proper treatment of hay fever, or hay asthma. Of course these cases like other instances of disease, are not all similar, and the treatment which appears to be of great benefit at times, is wholly negative at others. Still in reflecting upon my own experience with this disease, I am confidently of the opinion that local treatment is more important than change of residence, and, further, that the peripheral nerves in the inflamed nasal mucous membrane are oftener a source of the sneezing and other painful symptoms of the disease than the great irritability, or sensitive condition of the nervous centres.

I have read with much interest some of the contributions of Dr. Beverly Kinnear in regard to the remarkable curative effects obtained by him in the treatment of hay fever with the spinal ice-bag. I have not, I regret to say, been entirely convinced by his statements, either of the entire correctness of his theories or of the curative results obtained.

Whilst it seems to me proper to make this statement in view of the great importance Dr. Kinnear attaches to his treatment with the ice-bag, I am happy to add that in conjunction with cauterization of the most sensitive areas in the nose by means of the galvano-cautery, or carbolic acid and glycerine, I believe very favorable results can be obtained in a large number of instances of an obstinate and most painful disease.

There are many other topics that I would like to touch upon even lightly and thus have the benefit in the discussion which I trust will follow my reading of this paper, of your own important observations and study. Time and your already tried patience forbid me to continue. To sum up. What I desire to say and what I wish most clearly to emphasize is this: For the best treatment of inflammatory affections of the upper air-passages, the general practitioner and the specialist must really work together. You can scarcely separate them if the work accom-

plished is to be wholly satisfactory. Therefore either the patient must have two physicians to care for him, or he must look to his family medical adviser for such a measure of knowledge in regard to laryngology and rhinology as to render him able and willing to treat inflammatory conditions of the upper air-passages according to the latest and most approved methods. There will always remain, however, a certain number of patients who in view of special complications, or difficulties pertaining to their disease, will improve sooner if they are taken care of exclusively from the beginning of their trouble and throughout its duration, by the wellinformed specialist. When a proper estimate is made of the greatest good to the greatest number in instances in which only one physician can be employed, I am confident that the verdict should be that the general physician with only a limited experience in the treatment of nasal and throat diseases, will be a safer and wiser guide than the most skilful and best versed specialist.

#### DISCUSSION.

F. H. Bosworth, M.D. I have been much interested in Dr. Robinson's paper, and the admirable manner in which he has presented the subject. I do not recall a better presentation of the subject of the lingual tonsil. When he speaks of the influence of the general system on catarrhal diseases, I think that we are confronted with a certain vagueness in the expression "catarrh." The systemic influence upon diseases of the naso-pharynx I fully concede, for they are notably influenced by rheumatism, gout, and diseases of that kind, and especially by derangements of the digestive apparatus. When we come to diseases of the nasal cavity proper I am disposed to think that they are but in a very slight degree affected by constitutional conditions. This distinction between the nose and the naso-pharynx I regard as very important, and Dr. Robinson has not sufficiently regarded it.

E. L. Shurley, M.D. I too, fully, indorse what the writer of the paper has said. It has always seemed to me that this matter of nasal hypertrophy was a relative thing. Regarding bald heads we don't know how long it will be before bald heads will be normal!

So that, for the purposes of this discussion, we might adopt the standard that those noses presenting hypertrophied turbinated bodies or deflected septa are normal, and become abnormal only as soon as they produce some subjective symptom or other of discomfort. It may be, that the man under observation is a chronic snuff-taker, with nasal mucous membrane in a state of continual irritation. Now, it is useless to burn such a person's nasal mucous membrane as long as the habit is indulged. Therefore it occurs to me, that unless the nasal passages present stenosis from chronic structural change, or from more recent inflammatory change, or a growth which results from such causes that surgical interference is not necessary. A few years ago I presented a paper to the American Laryngological Association on the result of, I think, about two hundred observations of the naso-pharynx and pharynx of persons met with in hospitals and elsewhere, who did not complain of any nasal, naso-pharyngeal, or pharyngeal disturbances, many of whom were affected with enlarged tonsils and various degrees of swelling and congestion of these mucous membranes. I know now of two persons who are very fine singers with greatly enlarged tonsils and who will not consent to have their tonsils cut. They have such immense tonsils that I am sure any one of us would advise such cutting. Therefore, as I said before, I think this is a relative matter. We have no standard which can be followed as to surgical treatment on a purely local basis.

## A STUDY OF THE SPUTUM IN PULMONARY CONSUMPTION.

By E. L. SHURLY, M.D., DETROIT, MICH.

THE following thoughts and observations are presented as an outline of some work which Dr. Gibbes and myself have undertaken in an endeavor to trace out the pathology and pathological chemistry of so-called tuberculosis.

That the morbific agent is contained in the sputum there is now no doubt, as attested by the numerous instances of its effects in producing the disease in the lower animals by inoculation or insufflation. That its morbific character can, however, be altered or neutralized by several different chemicals outside of the body, and after introduction into the body, we have shown, as attested by the animals now living, which have been subjected to such tests. But just what the particular properties of sputum are, which produce the several varieties of the disease in question in lower animals, we believe is not yet settled, and therefore it is to these questions that I now invite attention.

The prevailing belief is, that, first, bacteria and then bacterial products constitute the principal, if not sole cause of so-called tuberculosis, in all of its varying clinical phenomena. Be this as it may, there is no adequate explanation of the relation of the tissues involved to these things, from any point of view yet given. In other words, we cannot elucidate the first step in the pathogenesis which seems necessary to prepare the way for the action of the bacteria or their products.

The recent labors of Zuegler, Prudden, Buchner, Behring, Roux, Trouessart, McWilliams, and others toward a chemical analysis of the products of microbiosis, especially of the tubercle baccillus, begin to shed some light on the subject, so that we may hope for a solution of the problems in the near future.

Yet it seems to us, that a critical chemical examination, in a comparative manner, of the sputum derived from cases representing the recognized varieties of pulmonary phthisis is a necessary first step of investigation, unless it be admitted that tubercle bacilli not only constitute the sole primary cause of these clinical varieties but also the basis of all further steps of pathogenesis. If this were admitted, then why should A. suffer from laryngeal phthisis, who was never exposed particularly, who never suffered from any sensible throat affection, whose family history and mode of life were excellent; and B. of the same family and whose mode of life was bad, who suffered from abrasions and inflammations of the throat and air passages, and who had been exposed particularly, escape or, perhaps, contract fibroid phthisis later in life? And again, why should C. under similar favorable conditions suffer from acute general tuberculosis; and D. subject to similar environment contract laryngeal phthisis, and so on?

If, therefore, as we have seen, the sputum really contains the materies morbi, and if, from our knowledge of the morphology and physiology of the tubercle bacilli, we cannot account for the early phenomena, it becomes incumbent upon us, not only to ascertain, if possible, what these products are, but what their relation is to the tissue change in the first steps of the disease; that is, whether toxic proteids or alkaloids, originating independently of bacteria, by cell- or lymph-necrosis or alteration, play a part in the morbid process, so that we can form a basis for therapeutic action with more or less exactitude.

Hence, the objects of such study would naturally be to ascertain just what the proteids or alkaloids of the sputum are, in the different classes of cases; whether noxious or not, individually; and whether the product of a morbid process, induced or protracted by tubercle bacilli, or independently of them.

The work of Luckjanow "On the General Pathology of the Cell" is highly interesting in this connection as showing the wonderful metamorphosis which these elements undergo through chemical as well as physical action in disease.

The micro-organisms commonly found in the sputum are of great variety; some of which belong particularly to the mouth, while many (such as the bacillus subtilis, bacterium termo, and



micrococcus tetragenus, diplococci, streptococci, staphlococci, pneumococci, and other varieties), have been found in the respiratory passages, and in lung-cavities according to Biondi, Gaff'ky, David, and others. Although under ordinary conditions saprogenic (Trouessert, Vernueil, Moos, Netler, Zanfal) yet, as suggested by David and Cornil and Babes, any revulsion of the system may render them more or less pathogenic.

The composition of normal sputum, as ordinarily given in the text-books, is as follows: According to Landois and Sterling, it shows microscopically, epithelial cells, and lymphoid cells. The fluid substance of the sputum contains much mucus, together with nuclein, lecithin, and the constituents of saliva.

Under pathological conditions there may be found albumen, red blood corpuscles, pus, elastic fibres, plugs of fibrin, casts of larger or smaller bronchi, crystals of various kinds, fatty acids, and occasionally leucin and tyrosin, Charcot's crystals, hæmotoidin and chlolesterin, fungi, and lower organisms taken in during respiration, threads of leptothix, mycelium, and spores of oidum albicans, various rod-shaped bacteria, monads, and cercomonads.

We are investigating now the sputum obtained from several different cases of pulmonary phthisis, all of which are quite advanced.

Case B.—General tuberculosis.

Case H.—Acute miliary tuberculosis.

Case K.—Chronic fibroid phthisis.

Case D.—Sub-acute phthisis.

Case C.—Ordinary chronic phthisis with large excavation, the case now being under treatment.

Two lines of procedure are in progress: First, by cultivation of the microbes in different media under different conditions; and second, chemical examination, and the inoculation of the several derived products in mice, guinea-pigs, and rabbits. As mentioned before, the work is too incomplete to draw definite conclusions, but a few results have been obtained which may be interesting. Our chemical procedure in the main is something as follows: The sputum is collected in the morning, after the patient's mouth has been washed out with a solution of salt and water. In all instances

it is first either boiled from one to two hours, or heated at a high temperature in a culture-oven, having been mixed with either distilled water, alcohol, solution of sodium hydrate, hydrochloric acid, or saturated solution of sodium chloride, in equal proportions. Concerning mucin, we find that it varies very much in its reactions according to the specimen. From several specimens we were unable to separate any at all. We thoroughly believe with Lowenberg that mucin varies in its nature according to the animal or substance from which it is obtained.

H—sputum. Four ounces of this was diluted with an equal part of water, and two drachms of sodium hydrate were added; it was then boiled with an inverted condenser for two hours over a sand-bath and filtered. The clear filtrate gave the following reactions:—

Reagents.			Precipitates.
Alcohol			Faint white.
Ammonium chloride			White.
" hydrate			None.
Silver nitrate .			A dirty brown.
Barium chloride			White.
" hydrate		•,	Brown.
" nitrate			White.
Calcium chloride			66
Copper sulphate			Blue.

Part of the original filtrate was acidified with acetic acid, and lead acetate was added in excess. The resulting white precipitate was filtered off, and hydrogen sulphide was passed through the filtrate to remove the lead. After standing in a test tube plugged with cotton, and after the precipitated sulphur had been removed, the extract thus freed of mucin, which was acid, gave the following reactions:—

Reagents.		Precipitates.
Lead acetate		None.
Gold chloride		66
Potassio-mercuric-iodide		66
Phospho-molybdic acid		6.6
Phospho-tungstic acid		White.
Sulpho-salicylic acid		None.

The precipitate obtained with phospho-tungstic acid was washed and desiccated over sulphuric acid.

The whitish residue was stirred up with a little distilled water, and five minims were injected into a mouse. The animal was sick for a week, and after several weeks escaped.

A portion of the original filtrate was placed in a test-tube and carbonic acid gas was passed through it for twenty-four hours; this was then allowed to stand for two weeks. A white precipitate gradually formed. The supernatant fluid was decanted off and treated as follows:—

Reagents.		Precipitates.
Phospho-molybdic acid		White.
Phospho-tungstic acid		6.6
Tartaric acid		66
Lead acetate		66

Five minims of this supernatant fluid were injected into a mouse. The animal lived twenty-two days (the same number of days that the animal lived that was injected with the glycerine extract of the B—sputum). The post-mortem examination showed a general softening of the tissues.

C—sputum. Four ounces were treated with an equal quantity of a strong solution of tartaric acid, shaken at intervals during an hour, and filtered. • The clear filtrate gave the following reactions:—

Reagents.	-	Precipitates.
Phospho-molybdic acid	. W	hite.
Gold chloride	. N	one.
Sulpho-salicylic acid	. W	hite.
Phospho-tungstic acid		"
Lead acetate	. D	ense white.
Ferric chloride .	. N	one.
Potassium ferricyanide	. G	reen.
" bichromate	. R	ed.
" ferrocyanide	. W	hite.
Tannic acid	. D	ense greenish-vellow

Two and a-half grains of the phospho-tungstic precipitate were rubbed up with fifteen minims of pure glycerine, and three minims of this mixture injected into a mouse. The mouse died after three days. A like solution of phospho-tungstic acid did not kill the control mouse.

Four ounces of the sputum were treated with eight ounces of water and thirty grains of citric acid, shaken frequently for an hour and filtered. This gave the following reactions:—

Reagents.			Precipitates.
Lead acetate .			None.
Hydrochloric acid			6 6
Nitrie acid .			66
Platinic chloride			66
Mercuric chloride			66
Tannie acid .	•	•	Slight gray

This shows entire absence of albumens. The gray precipitate may have been due to a trace of iron. Twenty-five minims injected into a rabbit failed to produce death, as also twenty-five minims, injected into another rabbit, of the filtrate procured from the tartaric sputum. Two ounces of sputum were treated with an equal quantity of alcohol, heated gently over a water-bath for fifteen minutes, and filtered; lead acetate was added, hydrogen sulphide passed through, filtered into a test-tube plugged with cotton, and allowed to stand two weeks. This gave the following reactions:—

Reagents.		Precipitates.
Lead acetate		None.
Gold chloride		Brownish-black.
Sulpho-salicylic acid		None.
Potassio-mercuric-iodide		66
Phospho-tungstic acid		White.
Phospho-molybdic acid		66

Five minims of this alcoholic extract (mucin free) were injected into a mouse. The animal died in fifteen days. The precipitate with phospho-molybdic acid was stirred up with distilled water, and five minims were injected into a mouse. The animal had a convulsive chill lasting until death, which occurred after eight hours. The control mouse did not die.

A quantity of sputum was boiled with an equal bulk of water strongly acidulated with hydrochloric acid, and filtered. The clear filtrate gave the following reactions:—

This last precipitate was thoroughly washed and allowed to The heavy flaky mass was soluble in boiling nitric acid, but not in cold acid; soluble in cold hydrochloric acid. Heated with sulphuric acid a rose-colored opaque solution resulted. The precipitate was soluble in ammonium hydrate, insoluble in ether, readily soluble in ammonium sulphide. Solutions of this precipitate in ammonium sulphide, when injected into mice, caused speedy death; however, the control mice, injected with the ammonium sulphide alone, died in a short time also. We are now engaged in trying these solutions upon larger animals which do not succumb to the ammonium sulphide. Fifteen minims of a solution of this precipitate in ammonium sulphide, when injected into a guinea-pig, produced constitutional disturbances characterized by swelling of the glands of the neck, which diminished after two or three days. The precipitate, when rubbed upon an abraded surface of a rabbit's ear, produced an intense local inflammation lasting for several days. Nevertheless, the animal seemed to recover soon from any general illness. When the precipitate was treated with alcohol, it was found that a portion of it was dissolved; the alcohol was then decanted off and evaporated until a grayish powder remained. A ten per cent. solution of this powder (in glycerine) injected into a mouse caused death in ten minutes. A quantity of this same sputum was treated with an equal bulk of alcohol acidulated with acetic acid, boiled and filtered.

This gave the following reactions:—

D—sputum. This was diluted with an equal volume of distilled water, and kept at 99° F. for twelve hours, and filtered

three times (it gave a slightly acid reaction). This preparation produced the following reactions:—

Reagents.		Precipitates.
Nitrie acid		White ring.
Lead acetate		46
Hydrochloric acid .		None (cloudy after standing).
Ammonium carbonate		"
" chloride		66
" hydrate		"
oxalate.		Slightly cloudy.
Silver nitrate		Slightly yellow.
Barium chloride .		None.
" hydrate .		White.
" nitrate .		None.
Calcium chloride .		44
Copper sulphate .		"
Ferric chloride .		
Ferrous sulphate .		Cloudy.
Platinum chloride .		66
Ammonium sulphide		None.
Hydrogen sulphide .		66
Acetic acid	٠	Slight.
Potassium ferrocyanide		None.
" ferricyanide		Very slight.
" iodide .		None.
" carbonate		4.6
" hydrate .		Very slight.
Gold chloride		None.
Tartaric acid		White.
Potassio-mercuric-iodide		66
Formic acid		66
Phospho-molybdic acid		Blue.

We failed to produce any alkaloidal crystals from any of these precipitates.

D—sputum. An extract of this sputum was made with hydrochloric acid, and diluted one-half. Of this five minims were injected into a mouse, which died on the eighth day, having shown severe constitutional disturbance.

K—sputum. This was diluted with an equal volume of distilled water, and boiled for four hours with an inverted condenser over a sand-bath and filtered, and the filtrate labelled A-1. To the residue on the filter-paper a saturated solution of potassium

carbonate was added and allowed to pass through. This filtrate was labelled A-2. Alcohol was then added to the residue on the filter-paper and filtered. This filtrate was labelled A-3. Ether was added to what still remained on the filter-paper, and this filtrate labelled A-4.

A-1 was a milky fluid alkaline in reaction, and contained sugar by Fehling's test. Boiled with nitric acid it became clearer.

A-1 gave the following reactions:—

Reagents.				Precipitates.
Platinum chloride				None.
Mercuric chloride				66
Hydrochloric acid				"
Nitrie acid .				66
Copper sulphate				"
Boiled with potass	ium h	ydrat	е.	White flocculent.
Lead acetate .				White.
Silver nitrate .				Slight white.
Ammonium oxalat	e .		•	White.
Gold chloride .				None.

The precipitate obtained with potassium hydrate and heat was filtered and the residuum washed, dessicated, and a five per cent. solution was made in water. Of this solution five minims were injected into a mouse. The animal died seven days afterward. No alteration of tissues noted on post-mortem examination.

A-3 gave the following reactions:—

Reagents.		Precipitates.
Tannic acid		Dense gray.
Phospho-molybdic acid		Slight white.
Phospho-tungstic acid		Dense white.
Acetic acid	•	None.

Five drops of the A-3 solution injected into a mouse caused the animal's death in an hour.

B—sputum. This was diluted with an equal part of glycerine heated over a water-bath for half an hour, and then filtered by means of an exhaust pump through a plaster plug in the funnel. Three minims of this injected into a mouse caused death in twenty-two days. Post-mortem examination revealed a general softening of the tissues, but no particular local change.

Another portion was treated with water and ether, shaken thoroughly, and allowed to settle. The ether was then removed by means of a separating funnel, alcohol was added to the residue, and separated. The ether extract failed to show any reaction with any reagents at our disposal; and, when allowed to evaporate, left a scarcely perceptible deposit. The alcoholic extract failed to respond to all reagents used excepting tannic acid. From this we may conclude that heat is necessary in the process of chemical separation.

It may be asked what these precipitates are: whether acid albumen, alkali albumens, alkaloids, etc. We can only reply that we have been unable in many instances to obtain satisfactory results, although following closely processes published by well-known chemists. Mr. P. M. Hickey, also our assistant at the Harper Hospital Laboratory, who is a diligent scientific man and a good chemist, has spent much time and thought, especially in this direction, without being able to identify and classify many of the products thrown out.

We hope soon to be able to show some of the ulterior pathological results in guinea-pigs, rabbits, and monkeys, from the inoculation of the elements of the sputum under consideration. We hope also to learn the effects of so-called bacteria proteids on organic substances, and on the lower animals; and, finally, if practicable, to work out some systematic method for their neutralization in the body.

#### DISCUSSION.

J. H. TYNDALE, M.D. I have heretofore had explained to me the results of the labors of Dr. Shurly and his coadjutor, and hope that hereafter their labors will result in something more tangible.

ALBERT L. GIHON, M.D., U.S.N. I do not desire to discuss the matter, but would like to make the suggestion to Dr. Shurly that he continue his investigations and that in the paper which we hope he will give us next year he may suggest some practical

way of getting rid of this dangerous sputum being scattered all around. Last December I went to Charleston on board a steamer on which there were some thirty consumptives on their way to Florida, many of whom insisted upon having every window and door in the cabin shut, and all the fires going, and they were expectorating in every direction, soiling carpets, cushions, curtains, and the bedding of their own state-rooms. There was, accordingly, great danger to those of us who had receptive lungs. the naval hospital of which I have charge, it is easy for me to compel the patients to use the paper spit-cup. I say it is easy but not so very easy after all, for though when they expectorate in their own wards and under supervision of the nurses I can compel them to use the paper cup, they are less careful about doing so on the corridors and stairways. The majority, however, get so that they will, if they can avoid it, not expectorate, and so contract the habit of swallowing the sputum. So it seems to me that if I could not wholly compel the use of paper spit-cups in a military hospital, it would certainly be very difficult in civil life to prevent people from ejecting sputum in steam-cars and steamboats, which are often overheated, especially those which carry invalids.

So far as there shall be any possible way of disposing of sputum with proper regard to sanitary conditions Dr. Shurly should be the man to discover it by his investigations, and give us the result in his next paper.

H. F. WILLIAMS, M.D. I was specially interested with Dr. Shurly's account of his labors. I believe it quite probable that further biological research will discover a great deal of difference in the strength and innocuousness of the bacilli, dependent upon the number of removes from the primary culture of each colony. I do not see how it is possible to explain the violence of the symptoms which exhibit themselves in certain cases without any proportionate lesion except on the ground of violence in the germ itself. I believe one section of Dr. Shurly's paper referred to that.

# GYMNASTIC EXERCISE AS A PROPHYLACTIC AND CURATIVE REMEDY IN CHEST DISEASES.

By EDWARD O. OTIS, M.D., BOSTON, MASS.

In my capacity as Medical Director of a city gymnasium, I have had occasion to examine physically, and prescribe exercise for a good many men and boys. They were examined on joining the gymnasium and, when they would, at a later period. Of each person examined, the capacity and strength of the lungs were determined by means of the water spirometer and manometer. The circumference of the chest was taken about the nipples and at the ninth rib in the natural and inflated condition; and a stethoscopic examination of the apices of the lungs was made. The heart also, at the aortic and mitral valves, was examined in each case, and rated as strong or fair according to its general action. Although my clinic was one of well people, and not one of diseased hearts and lungs, except in a few sporadic cases, yet the varying conditions of these organs observed inside of the diseased limit, and coming perilously near it, and the effect upon them of systematic gymnastic exercise, scientifically applied and persisted in, convinces me that in gymnastic exercise we have a prophylactic agent of great value in diseases of the chest, and a valuable aid in the maintenance of sound and vigorous hearts and lungs, especially under the trying conditions of indoor or city life. Further, my experience is suggestive of a more extended use of gymnastic exercise as a therapeutic measure of no mean value in actual diseases of these organs. Among men of sedentary habits, between the ages especially of thirty and fifty years, the conditions I have frequently met with are as follows:-

First, a certain lack of vigor and firmness in the action of the heart: this condition I have been in the habit of calling the

"sedentary" heart. The possessor of it is often overweight, and exhibits a shortness of breath on any vigorous exertion. He has probably taken little if any exercise for many years, and never walks up stairs when he can take an elevator. He indulges in an abundance of nitrogenous food, and spends most of his time in an overheated, indoor atmosphere. His increased weight, indigestion, or shortness of breath drives him either directly or indirectly, through his physicians, to the gymnasium, to see what can be done for him there.

Secondly, poor and incomplete expansion of the lungs is observed; and in this case it may be a thin, round-shouldered man, who leans over a desk all day. The capacity of his lungs does not come up to the average 230 cubic inches, and their expulsive power is below the average number of kilos. The respiration is mostly diaphragmatic; and the intercostals, either from disuse or lack of training, take very little part in it. The difference in the girth of the chest in repose and full may not be more than one or two centimetres. At the apices of the lungs on full inspiration a crepitant râle or two are heard which reveal the fact that he has unused air-vesicles in the top of his lungs. Neither of these conditions is that of disease, but both are a menace to the individual, as easily crossing the border line into absolute morbid states of heart or lungs; or as proving totally inadequate to do their part when unusual demands are made upon them, which may at any time occur so long as man and his environment are what they are, and, in consequence, dire results may ensue.

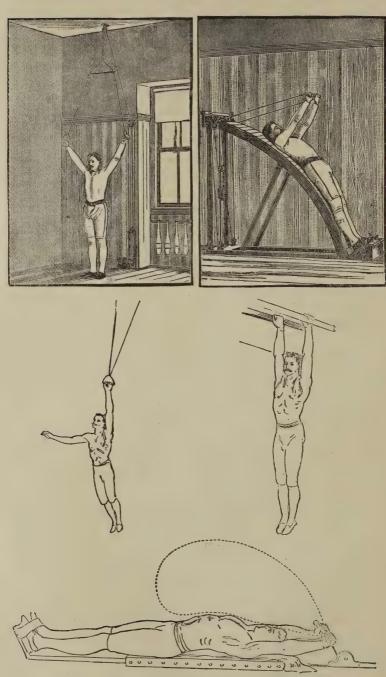
How many deaths one now hears of from "heart-failure." Is not the condition of the heart I have above described provocative of this disastrous accident under unusual stress of disease or excitement?

As preliminary to what I have to say later, I shall give the general method I pursue in the examination and the prescribing of exercise for the men who come under my care: but, first, it may be well to say that my clientele comes from all conditions, and is of all ages, from the boy of fourteen to the old man of seventy. Most of them lead sedentary lives; they are clerks, bookkeepers, artisans of all kinds, printers, stenographers, telegraphers, electricians, photographers, draughtsmen, artists, musi-

cians, students, lawyers, and clergymen. Like the Kulturmensch of Eulenburg, who, "zu athmen vergesse," so, too, do men of these indoor and sedentary occupations not only forget to breathe properly, but many of them have never learned to do so.

A life history is first taken of the man to be examined, with some facts as to his heredity. His strength tests are then determined as accurately as may be—upper and forearm muscles, pectorals, back, and legs, expiratory strength, and capacity of lungs. His weight is taken, and the muscular with more or less of the bony girths. The depth of the chest is taken with calipers, and the breadth of the shoulders, with that of the head, neck, waist, hips, and nipples. The length of shoulder to elbow, elbow to fingertip, knee to foot, is determined; and the height, standing, sitting, and of the pubes, navel, and sternum. A stethoscopic examination of the heart is made, and of the apices of the lungs. Lastly, a careful occular inspection is made; and the general condition, as to tone of muscles, character of the skin, lack or overabundance of adipose tissue, symmetry or asymmetry of the body, position of the body when standing naturally, is noted. There are innumerable points in an inspection of this kind which are observed by one accustomed to this sort of looking. Next the exercise is prescribed; the kind, quantity, and method being based upon the data obtained by the examination. Advice as to personal hygiene, eating, sleeping, bathing, and habits of work is also given. The individual is now handed over to the superintendent, who is thoroughly trained in practical work, and, under careful supervision and instruction, the prescription is carried out.

If the person be one of that class to which I have referred, of overweight, with a "sedentary" heart and poor lung expansion, soft muscles, and a low per cent. in strength tests, he is put upon light, slow work at first, whatever it may be. The course I generally recommend is something like the following: Rapid walking or slow running a few times around the track; lung-expanding apparatus of various kinds; some easy courses upon the chest-weights; a little rowing upon a Kearn's machine, which is a most admirable piece of apparatus; some freehand work, or with light wooden dumb-bells. Class exercises may be



Forms of Lung Expanding Apparatus.

taken, but with caution at first, for class-work is more or less violent, and one should gradually work up to it. The so-called "medicine-ball" and shot, and the flying rings may also be added. From twenty minutes to half an hour is long enough to begin with, and this but three or four times a week. If all goes well, the duration of the time of exercise and the amount may be increased; instead of running two or three laps, he may run ten or more. Often, after the prescribed work has been gone through with, the individual is allowed, for a little while, to indulge in some favorite form of exercise, if he have such, like swinging the clubs, the use of the punch-bag, or a game of hand-ball. This distracts from the monotony of the routine of the prescribed work, and makes the whole thing less irksome.

After exercising, I generally advise a sponge or shower bath, beginning with warm water and ending with cooler or cold water, according to the reaction. Of course, it goes without saying that the air of the gymnasium should be as pure as good ventilation can make it. In a general gymnasium, where there are men and boys of various ages at work, and all exhibit that relaxation and cheerfulness born of quickened circulation and the pleasure of muscular exercise, our man obtains a certain inspiration from his new surroundings, and enters into his work with a zest and genuine delight; and what greater pleasure is there than that which comes from physical exercise? Of course, this gymnastic work does not preclude out-of-door exercise when the man's condition, his occupation, or the season of the year will allow it. Still, the ordinary forms of out-of-door exercise, walking, cycling, horseback riding, if the man's means will permit of any but the first of these, will not, in my opinion, do for his heart and lungs what a systematic course of physical exercise in a gymnasium, such as I have outlined, will accomplish.

I do not believe the spirometer, as a regular lung exercise, is of much avail; but rather to be used from time to time as a test. The lung expansion must be accomplished by the continued use of the various forms of lung-expanding apparatus (see figure), together with running, and, whenever the gymnasium is fortunate enough to possess a swimming-tank, by swimming. Swim-

ming is par excellence one of the best forms of exercise for rounding out the chest and expanding the lungs.

All who have had much experience in gymnastic work—and, indeed, any physician who examines many chests-must have frequently noticed that over-development of the shoulder, back, and chest muscles often proves a hindrance to good and large chest-expansion; the person with such development is likely to be "muscle-bound," in gymnasium parlance; his great and magnificent-looking muscular chest becomes an actual source of weakness to him, and I have not infrequently found that the chest expansion is below the average, and the capacity of the lungs not commensurate with the general strength of the man. This appearance of great strength and vigor is often misleading to one not accustomed to gymnasium work. In such cases all muscular chest work should be prohibited, and such exercises prescribed as will loosen up the hard, tense, chest muscles and develop the intercostals. Compare the chest of an ordinary athlete and that of a swimmer.

If, after such a course of physical exercise in a gymnasium as I have suggested, the man of "sedentary" heart and insufficient lung expansion be examined again several months later, the following changes are likely to be observed: First, the heart will exhibit a tone and vigor in its action which was wanting before. Second, the lungs will indicate fuller and larger expansion and increased strength; and the intercostals, from the exercise they have received, will be performing their proper part in the mechanism of respiration. If of overweight, adipose tissue will have disappeared, and the muscles, instead of being flabby and soft, will be firmer and more elastic. Moreover, the whole aspect of the man will have changed. Whereas, his countenance before looked pasty, dull-eyed, and perhaps haggard, it now shows the freshness and clear-eved condition of quickened circulation and increased inhalation of oxygen. Further, all the functions of the body will have become quickened. He feels himself "a new man."

This gymnastic remedy which I have described, for these vicious habits in non-diseased lungs, may be applicable, it seems to me,

under careful supervision, to actually diseased conditions in their inception.

To promote proper and greater chest expansion, more complete distention of the lungs, and to more frequently and thoroughly change the air entering the lungs, and so insure a greater amount of oxygen, is on the lines, to a certain extent, of the high altitude climatic cure. More rapid and fuller respiration and quickened circulation are what happen to a patient in the elevated health resorts, and they are important factors in the efficacy of this climatic cure. To be sure, we do not get the pure air in our gymnasium which one breathes on the high plateaus, but we do, by breathing it oftener and fuller, make the best use possible of what air we have to breathe; and, moreover, the majority of consumptives have to be treated at home with such means as are available. Merely to tell a patient to breathe deeply and fully is not sufficient. As a rule, he does not know how to do it, and often his intercostals are so weak from inaction that he cannot do it. Something more is necessary; he must be trained by carefully adapted gymnastic exercise. It is not enough to tell him to go to the gymnasium merely; his gymnastic work must only be undertaken under careful and constant supervision, with frequent examinations. Then only will he be benefited and not injured. Consumptives are sometimes advised or, on their own responsibility, attempt physical exercise at home by the use of the well-known chest-weights. This, it seems to me, is of very questionable utility. Pulling at a machine, all by one's self, is insufferably stupid work, and almost the inevitable result is that, after a time, it is abandoned from ennui. One needs the incentive to such work which comes from doing it in company with others, as in a gymnasium. Moreover, there is the same objection to it as to all physical exercise which is not carefully adapted to the patient and constantly supervised.

The cardiac diseases most appropriate for the exercise treatment are, according to Oertel, fatty heart and well-compensated heart failures. The mountain-climbing method of Oertel is familiar to you, and you have your opinion with regard to it. The defect in it seems to me that it cannot be as carefully regulated and graded as gymnastic exercise, or the patient kept under such constant

surveillance while taking it. As Dr. Schott says: "We cannot say when we may commence with this treatment, or how high or far the patient shall be allowed to climb." "There is always decided danger connected with this plan of mountain climbing," he goes on to say, and he has seen harm done to patients treated in this manner by Oertel and his disciples. He recommends first strengthening the heart muscles by means of baths and gymnastics. "There is no question," says Dr. Leaming,2 "about the benefit of regulated exercise and deep breathing in strengthening the heart muscles, and in expanding the lungs and chest. A great part of the benefit that comes to the heart in climbing inclines is in the expansion of the chest." He further states that the Swedish movement cure—which is merely scientifically-applied gymnastics, -and the health-lift-which, from its crudeness and danger, has now been abandoned—if used under proper supervision, are better than mountain-climbing, producing less fatigue and nervous excitation, and are safer because they deal more directly with chest expansion; in brief, he means to say that carefully-applied and supervised gymnastic exercise is better and safer, in cases of heart disease, where any exercise is considered proper, than the uncertain form of mountain-climbing.

Professor Liebstein,<sup>3</sup> in a paper upon "Muscular exercise or quiet for heart disease," says that he feels sure, from his experience, that strong, yet quiet movements, with quiet exhalations of air, work towards strengthening and slowing the action of the heart, as has already been made known by Schott.

"In cases where there is failure in complete contraction the distended ventricle is never entirely emptied, and the heart muscles become weary, and in the end incapable of performing their duty. Then by means of quiet, but energetic, muscular exercise the heart is strengthened, stirred up to effectual contraction, and, at the same time, the diastole grows in consequence of the slowing of the pulse. The increase of the arterial blood pressure acts on the vagus centre, more of the distending blood is forced out of the

<sup>&</sup>lt;sup>1</sup> Discussion at the Sixth German Congress for Internal Medicine, 1887.

<sup>&</sup>lt;sup>2</sup> International Medical Annual, 1889.

<sup>3</sup> Sixth German Medical Congress for Internal Medicine, 1887.

heart, and thereby the cause of the dilatation removed. Further, the rapidity of the blood stream increases in consequence of the increase of the arterial pressure. Then, after a number of strong contractions, this acceleration extends to the capillaries and the veins, and a better distribution of blood takes place throughout the entire vascular system. The improvement in the quality of blood lightens the work of the heart muscles, and in consequence of the stronger stream in the coronary arteries, the weakening remaining products are more promptly removed."

In cases of failure in which there is no compensation, or in which it has been lost, Liebstein advises first a period of quiet and forbearance, and then some easy form of muscular labor. He suggests the Swedish method improved by Schott. On the ground of his experience of the last four years, he advised the Oertel cure for chlorotics; "but, above all things," he adds, "it must be conducted with the greatest care, and its execution must not be left to the patient himself. The heart should not be allowed to be more rapid in its action than the lungs can follow, for deep breathing has a lightening influence." While, then, there is doubt among specialists as to the benefit and safety of Oertel's method of climbing inclines for certain forms of heart disease, there seems to be no doubt as to the therapeutic efficacy of moderate and carefully regulated gymnastic work for proper cases of heart disease.

This brief paper is but a suggestion of the possibilities of rightly applied gymnastic exercise both in the prophylaxis and treatment of chest diseases. I feel convinced from my own experience that it is a therapeutic resource of no mean value, and it may be that in our attention to climate and drugs, we have either quite forgotten it or undervalued its efficacy. It is a remedy that requires no change of climate to be efficacious, and the cost does not preclude its use by those of little means. It can be used in connection with the climatic cure and may enhance its efficacy. It may be well to add that, in my opinion, the best system of gymnastics is an eclectic one adapted to each especial case, rather than a too careful adhesion either to the Swedish or German system.

Particularly would I emphasize the value of judiciously applied gymnastic exercise to the large class of diaphragmatic breathers either with or without actual lung disease. The intercostals must be trained to do their share in the mechanism of respiration, if this function is to be satisfactorily and perfectly performed. Proper breathing, like proper eating, is with many people an acquired art; to be learned by the well, in order to maintain the integrity of their lungs; and to those of crippled lungs it must be the preliminary step to all other treatment either climatic or medicinal.

Since writing the above, and as a confirmation of the views I have herein expressed with regard to chest gymnastics, I was much gratified, in a recent visit to Dr. Turban's admirable Sanatorium at Davòs, to find that he made use of gymnastic exercise in the treatment of lung cases, with essentially the same movements I have above outlined. I might also incidentally remark that the paths about Davòs are rated as to steepness according to the Oertel system; so that here, if anywhere, his method could be followed with some degree of exactness.

### DISCUSSION.

H. F. WILLIAMS, M.D. I am quite sure that, if Dr. Otis can get control of the young people of Boston in time, he can dispute the conclusions that I propose to speak of to-morrow in reference to the outlook for discovering a specific for phthisis. I think there is a time when judicious exercise is of infinite value. At the same time we all know that the dangers of improper gymnastic exercise are very great, and one of these dangers is in producing hyperplasia of connective tissue, as it lowers the elasticity of the lung. Dr. Otis speaks of diaphragmatic breathing more in the way of the nomenclature of the physicians who have charge of gymnasia. I do not think he means by that the restriction of the diaphragm as a muscle. It became my pleasure to observe Edwin Checkley, and I had the opportunity also of examining him in repose and upon exertion. I am convinced that he has great control over his diaphragm. I do not know a muscle one can use properly with any more advantage than the diaphragm, and I can conceive of none more important in the respiratory act. Now, in reference to Professor Checkley in

regard to his muscular condition: he is not muscle-bound, in fact, in tranquillity, his muscles are as soft as those of any lady of ease and refinement in Washington, but with an effort of the will he can make them like steel. He believes that every implement that we use to develop the body is so much waste of power until the muscles are prepared to use it. In the system he proposes, the development of the inherent power of the muscles by contraction and relaxation is at the behest of the will power alone. I mention his case as an example of one whose muscles are powerful, without being muscle-bound, and I expect his theories as to the method of attaining this condition are sound. Well-directed gymnastic exercise is one of the most valuable prophylactics for tubercular disease, but I think it should be carefully regulated.

A. L. GIHON, M.D., U.S.N. I wish to emphasize what Dr. Williams has said respecting the necessity for intelligent supervision of athletic exercises. During the time that I was connected with the Naval Academy, the cadets who had carefully directed exercise generally did well, but after leaving the Academy and changing their mode of life to one under which they were compelled to discontinue their exercise, their condition became bad and probably worse than if they had not exercised at all. I know of numerous instances among the famous gymnasts of the Academy, of young men whose subsequent physical life did not fulfil the promise of their school-time powers, some of them being below the average in endurance of the rest of their classmates. At the Marine Barracks at Brooklyn, where the men are provided with gymnastic apparatus and where they engage in exercise without any intelligent direction, hernia is becoming very common.

EDWARD O. OTIS, M.D. In answer to the question of one of the gentlemen who has spoken regarding cycling, I will say that whereas it may be a good form of exercise for strengthening the heart, it does not seem to me equally good for expanding the lungs. I have observed, particularly in England, where one sees so many bicyclists, that there is a tendency to ride with the shoulders bent forward, which is a position not conducive to good lung expansion.

I emphasized in my paper the dangers of exercise which had not been carefully prescribed and was not constantly supervised. The aim of modern gymnastic work is to symmetrically develop the whole body and improve all its functions, and not to make athletes who are often unsymmetrically developed.

As to the intercostal muscles: my experience has been with the men I have had to do with—and they were principally of indoor sedentary occupations—that the breathing was mostly diaphragmatic and imperfect, and that the intercostals did not do their part in the mechanism of respiration. This fault can be remedied by such gymnastic work as will develop these muscles—lung expanding machines.

THE HISTOLOGICAL CHANGES WHICH TAKE PLACE IN THE LUNGS IN CURED PHTHISIS PULMONALIS, AND THE INFLUENCE OF DIATHESIS IN THE DEVELOPMENT OF SUCH CHANGE.

By ALFRED L. LOOMIS, M.D., LL.D., NEW YORK.

Gentlemen: That a process of healing is developed in the lungs of a certain proportion of phthisical subjects seems well established by a large number of well-authenticated phthisical histories, and the possibility of such an occurrence has long been accepted by our best clinical observers; but the histological processes in such recoveries have not been sufficiently studied in the light of recent advances in the etiology and pathology of tuberculosis.

The observations which I shall present on this subject are based on the records of 524 post-mortem examinations made in the Bellevue Hospital dead-house on persons dying of non-tubercular diseases, which were collected and analyzed by Dr. H. P. Loomis. The lungs in 8 per cent. of this number presented changes which I shall describe as local evidences of cured tuber-This is the highest ratio of recoveries from pulmonary tuberculosis, based on post-mortem records, given by any observer except Vibert, who states (in the London Lancet) "that at the Paris Morgue he found in 17 of 131 persons dying from violence or sudden death the evidences of pulmonary tuberculosis which had been cured." The first question that meets us in these investigations is, What are the lesions which may be regarded as evidence of cured phthisis? Pathologists have long regarded patches of induration at the apex of the lungs as indications of the previous existence of active phthisical processes; but such patches present none of the special histological characters of tuberculosis, and might have been developed by other causes of local irritation than tubercle. Until the discovery of the tubercle bacillus it was impossible to determine with absolute certainty when masses of fibrous tissue were found in the lungs whether the antecedent affection had or had not been tuberculous.

The gross appearances of the lungs of the 44 cases included in these records were as follows:—

In 38, the apex of the affected lung was found firmly adherent to the costal pleura, with more or less puckering and depression of the adherent surface. On section, from one to ten fibrous nodules were found scattered through the lung apex, varying in size from a few lines to an inch in diameter. These nodules, in most instances, were situated just beneath the depressed adherent surface, and were continuous with the thickened pleura. A few were found situated in the central portion of the upper lobe, and were connected with the pleural surface by dense bands of fibrous tissue. In the central portions of the larger nodules, soft cheesy or calcareous masses were usually found; a few contained no cheesy or calcareous matter. In six instances, small closed cavities, lined by a thick, dense, fibrous membrane and containing a soft, cretaceous material, occupied the centre of large nodules. A linear cicatrix was found in a few nodules marking the site of a healed cavity. Immediately around many of the nodules were lamellæ of less dense fibrous tissue, which was often traversed by contracted, obliterated, and dilated bronchi and impervious bloodyessels. In the immediate neighborhood of the nodules, while the lung tissue appeared normal, it was found more or less emphysematous. In two instances, the entire upper lobe of the lung was transformed into a homogeneous fibrous mass. The fibrous tissue composing the nodules was more or less deeply pigmented. In all of the 44 cases, careful studies were made of sections from the nodules and the lung tissue surrounding the nodules. In these sections more or less completely organized fibrous tissue was the prominent histological change. In many, at the edge of the tissue destroyed by the tubercular process, new connective tissue could be seen just developing, and it was evident that the fibroid processes originated in one of three ways:

First. By round-cell infiltrations of the interlobular connective tissue, so that often the interlobular septa was increased tenfold. Second. By round-cell infiltrations of the alveolar walls. In one section adjoining a contracted and encapsulated nodule, the alveolar walls were seen in all stages of fibroid development from round-cell infiltration up to fully organized fibrous tissue. Third. By round-cell infiltrations around the vessels and bronchi, which became contracted and obliterated by the fully developed fibroid growth. In some sections pleuritic fibrosis seemed to be the first change, and in all lines of fibroid tissue could be traced from the nodules to the pleura. There was no evidence in any section that the tubercular tissue itself furnished the fibroid development, but the fibroid processes were developed in the normal connective tissue in such a manner as to obliterate the avenue of tubercular infection. This corresponds to Ziegler's statement "that the arrest of tuberculosis can only take place when the inflammatory process issues in the development of fibrous tissue." One condition was so constantly present as to lead to the conclusion that it was an essential condition, viz., a condition of intense hyperæmia which always surrounded the tubercular areas where recent fibroid processes were active. The fully developed fibroid masses were also found studded with new capillary vessels. was impossible in any of the sections to make out the different elements which enter into the composition of tubercle. In some a few giant cells could be made out. A large number of sections were stained for tubercle bacilli, but they could be detected in only one or two.

Inoculative experiments upon animals, conducted in the "Loomis Laboratory," by Dr. H. P. Loomis, to determine whether tubercle bacilli were present in the larger nodules which, containing cheesy deposits, gave the following results:—

Twelve healthy rabbits were inoculated under antiseptic precautions, with 2 cc. of a fluid obtained by dissolving the contents of the larger nodules removed from twelve different lungs. Of these, five were proven to contain bacilli by the development of tubercular lesions in the inoculated animals. The remaining seven gave negative results. In no one of the animals in which localized tubercular lesions were developed was the infection sufficiently intense to produce general tuberculosis. It is quite possible, in fact it is probable, that, if the contents of all the nodules found in those lungs which gave negative results had been tested by inoculation experiments, tubercular lesions would have followed the inoculation in a much larger proportion.

From these histological studies it seems evident that the only way in which the arrest of tubercular processes in the lungs can be accomplished is by the development of fibroid processes in and around the tubercular areas, and the question arises why do these reparative processes occur only in a limited number of tubercular subjects? I am convinced that the answer to this question is to be found in the diathetic tendencies of different individuals. In one person the tendency to fibroid development is above the normal of systemic harmony. In another, rapid parenchymatous cellular developments occur under purely physiological stimulus, and become excessive under pathological. We call these conditions fibroid and strumous diathesis. It is, however, important to remember that fibroid processes which are injurious under some conditions may become directly conservative under others, and two opposing diatheses may result in the relief or cure of diseases produced by one or the other, the result being obtained by the very intensity of the diathetic condition. Whenever necrotic changes occur in the parenchymatous tissue, fibroid development is the only method of repair; but when the cause of the necrosis is especially powerful, only a pathologically strong fibroid activity will suffice for its arrest. The histories of many cases of pulmonary tuberculosis afford striking proof of this antagonistic action of diathesis. I have long been convinced that there is a relative immunity possessed by arthritic individuals, not only against pulmonary, but against all forms of tuberculosis, and I have made many observations which appear to me to prove that in a patient whose parents suffered from general fibrosis, or who presents active evidences of this diathesis, tuberculosis of the lungs, bones, joints, and glands shows a marked tendency to assume a chronic course and to a spontaneous cure. This relative immunity against phthisis possessed by individuals with a fibroid diathesis, and their power to resist tubercular processes when they have once become established, apart from the biological and chemical aspect

of the question, no doubt rests on the basis of the antagonism of diathesis. The following briefs of typical histories illustrate this conservative diathetic antagonism in a very striking manner:—

Case I. is an illustration of the inhibitory influences of gout over progressive phthisis.

Female, æt. 47. Father suffered from gout, with great deformity and chalky deposits in the joints for many years, and died at 63 years of renal and cardiac disease; mother died of phthisis at 60. Patient was always delicate; at the age of 44 she was taken with acute pulmonary symptoms, lost flesh and strength rapidly, and extensive infiltration occurred at the left apex; laryngeal symptoms accompanied the pulmonary infiltration, attended by complete aphonia; her laryngeal disease was diagnosticated by several expert laryngologists as tubercular. When she first came under my observation she presented the symptoms of advanced phthisis, with signs of cavity at the left After a residence of several months in the Adirondack Mountains her phthisical symptoms began to improve and arthritic symptoms manifested themselves—the small joints enlarged and showed chalky concretions. For the past three years the pulmonary disease has steadily retrograded. The laryngeal symptoms have subsided and her larynx now presents a normal appearance. Dry tubular breathing is heard at the left apex; there is little cough and no expectoration. The general health is good, except the gouty symptoms and the joint deformations. The heart is hypertrophied, and the arteries are hard and show tension, the urine is constantly loaded with urates,

CASE II. illustrates phthisical arrest in a young person with arthritic symptoms. Male, et. 25. Father, gouty; mother, healthy. Patient, after losing flesh and strength for three months, had a profuse hæmoptysis, followed by fever, cough, expectoration, rapid emaciation, and the usual symptoms of rapidly-progressive pulmonary tuberculosis, with extensive infiltration of the right apex. Six months after changing climate and habit of life, his phthisical processes seemed arrested and his general condition slightly improved. Suddenly he was attacked with acute arthritic symptoms, which confined him to bed for six weeks; his convalescence from his arthritis was slow; several of.

his joints became stiff, which compelled him to use crutches for several months, during which time his pulmonary symptoms subsided, and after a year he had apparently entirely recovered. Physical examination of his chest now gave only tubular breathing and dullness at the right apex; no moist sounds. His arthritic symptoms remain, with permanent crippling of the kneejoints; his heart is hypertrophied; his arteries are hard and give the evidence of high tension.

Case III. illustrates the effect of the development of cardiovascular and renal fibrosis in arresting phthisis in one with a strong fibroid heredity.

Female, et. 58. Father and three of her brothers, after developing cardio-vascular disease at about 40, died of apoplexy, between 50 and 60; mother died of phthisis. Her three brothers, now living, have gout, with large hearts and hard arteries. At 38 she was seized with a profuse pulmonary hemorrhage, without any premonitory symptoms. Two years afterward, while taking care of a daughter who died of acute phthisis, she had a second hemorrhage; lost flesh rapidly, and developed the usual symptoms of progressive phthisis. Prof. A. Clark at that time found the evidence of a cavity at the left apex, and by his advice she took up her residence in Sullivan County, N. Y. Gradually her phthisical symptoms subsided, and she developed well-marked gouty symptoms, with deformity of her joints. As her arthritic disease manifested itself, her pulmonary symptoms subsided, and she gained flesh and strength. Two years ago she consulted me for dyspeptic symptoms. I found her heart extensively hypertrophied and her arteries hard and tortuous. abundant; specific gravity, 1006; no albumin or easts.

At the apex of the left lung the thoracic wall was depressed, the percussion was amphoric; amphoric breathing and amphoric whispers were distinctly heard; there were no moist sounds; during the past six months she has suffered from attacks of dyspnea, and albumin has appeared in her urine.

Case IV. is an example of arrested phthisis in one in whom cardio-vascular disease was associated with lead-poisoning. Male, et. 55. Father and mother died at 75 and 78. There is no hereditary tendency to disease. He is a painter by trade. At 33

he had phthisical symptoms, from which he recovered and remained well until his 45th year, when he had repeated pulmonary hemorrhages, with extensive infiltration at the apex of the left lung. For two years he presented the symptoms of slowly-progressive phthisis, until he was thought by his physician and friends to have passed the possibilities of recovery. He then took up his residence in Western Virginia, and gradually regained his flesh and strength, and lost his cough. He now began to show the evidences of lead-poisoning, and soon after cardiac symptoms became so urgent that he was compelled to give up all physical labor. He never had any gouty or rheumatic symptoms, and led a temperate life. A physical examination revealed a dry cavity at the left apex, with extensive cardiac hypertrophy, hard and tortuous arteries, small liver; urine abundant, specific gravity 1010, a trace of albumin and hyaline casts. Slight physical exertion brings on severe attacks of dyspnæa.

Of 70 cases of cured phthisis which have been under my personal observation 52 have presented well-marked evidences of general fibrosis, and Dr. E. L. Trudeau reports to me from the records of the Adirondack Sanitarium 21 cases of recovery in which arthritic fibrosis existed either in the parents or in the patients themselves. From a study of the histological changes, which I have presented as taking place in the lungs of those who have recovered from pulmonary tuberculosis, in connection with the histories of those that have recovered under my personal observation, I am better able to understand how a predominant hereditary tendency to general fibrosis becomes an important factor in such recoveries, and necessarily leads us to the conclusion that the prognosis in tuberculosis must be largely influenced by the diathesis and family history of the phthisical subject. Since the discovery of the tubercle bacillus many, in an ex eathedra fashion, have ignored the influence of diathesis and heredity in phthisis, and have proposed to class phthisis in the list of purely infectious diseases. That the tubercle bacillus is the exciting agent in all tubercular processes, our present knowledge leaves no room for doubt; but we must search in long-recognized and well-established constitutional influences for an explanation of its different behavior in different individuals. It is not enough to say that a youth of nineteen or twenty with a strong hereditary strumous diathesis develops his acute phthisis because of a more intense infection, or because the bacillus has entered his body by more direct lymphatic or vascular channels; but the explanation is rather to be found in the fact, that he has no antagonistic diathetic tendency to put in motion processes which shall throw out barriers at the seat of the primary infection, which will prevent the bacilli from entering those channels which allow of rapid and extensive tubercular infection. I am confident that if Koch's tuberculin has any power in arresting tubercular processes, it will be found to be due to its exciting around and within tubercular areas inflammatory processes which favor the development of fibroid processes.

I offer these incomplete studies with the hope of stimulating a more extended observation in the lines which they suggest.

### DISCUSSION.

FRANK FREMONT SMITH, M.D. It is, perhaps, interesting to remember that the work of Prof. Lannelongue, a French surgeon, mentions the fact that he injected chloride of zinc around tuberculous joints producing increased connective tissue formation, thus quarantining tuberculous masses.

A. Jacobi, M.D. If there be time, I should like to report what I have seen in those cases.

I have seen the cases of Lannelongue. I have been standing by his elbow and have seen every one of those cases he presented to us. It was about six weeks ago, during the second session of the Congress of Tuberculosis, the first having taken place three years ago; one of the features of it was the presentation of those cases.

The injections into the joints were made with a ten per cent. solution of chloride of zinc, the object being to produce a cure by throwing out, as Dr. Loomis says, new tissue. There were fifteen or twenty patients, children aged from two to seven or eight years. In all of them, we are told, injections had been

made, some only two or three weeks previously, and some five or six weeks. Every one of them was well, so we were told. I have the greatest respect for Dr. Lannelongue's studies, accomplishments, and zeal, but I have some also for my own eyes. In a number of cases when their joints were pressed and moved there was no pain. Some walked well, but we may as well not forget that patients with sore joints, when resting and fed in a hospital, are apt to improve. A tubercular joint ought to have more than a few weeks to prove that it remains well. In the short time of an exhibition nobody but the lecturer could make an examination. Nobody else could examine or did examine them but himself. In most cases he removed the covering or dress and examined the joints by touching them, etc. And I will here state what I know, that a number of those children had very great pain on being touched or moved. I do also know that those children were snatched from the table and hurried off, and were told that they were naughty, bad children, and they would not have any chocolate; that was the last of those children; I do not say that those children were not "well." I do say, however, that those children still had swollen joints, and that they had very acute pain when they were touched; that they were taken from the table and hurried to their rooms, and that they did not get any chocolate. Those who were well, or without pain, behaved well because they were well. They got chocolate.

Now that is what I have seen, and therefore I conclude that we had better wait for the effect of this medicine, when given in promiscuous cases.

H. F. WILLIAMS, M.D. Somewhat in the line of Dr. Loomis's conclusions are the old and well-tried deductions of Dr. Churchill in regard to the use of hypophosphites. Chalky deposits are concomitants of rheumatic gout, and people living in lime and hard-water districts suffer from nephrolithic affections. The calcareous deposits in degenerated lungs are said to have been produced by long-continued use of lime, soda, and potash salts, and around such deposits there is always more or less fibrous degeneration. If it be a fact that gouty and rheumatic diathesis

favors the development of a conservative fibrosis, then an artificial diathesis, by the use of the hypophosphites, should do the same thing. This might seem to confirm Dr. Loomis's impressions concerning the immunity from phthisis of gouty and rheumatic subjects.

ALFRED L. Loomis, M.D. The object of my paper was stated in the last few words to direct observations in the line which I hoped it would suggest. I did not claim that subjects would recover from phthisis by the use of arsenic. I only claim that in those cases of cured phthisis which have come within my observation very nearly two-thirds either presented, during the active progress of the phthisical processes or afterwards, arterial fibrosis; and that if phthisis is cured only by the development of fibroid processes in and around tubercular areas—if that is always the way in which cure takes place—it seems to me that anything that acts favorably on the development of fibroid processes would tend to the arrest and cure of pulmonary tuberculosis.

I would like to say a word about creasote, as I fear I shall not be here when the paper on that subject is read. I think my friend, Dr. Robinson, deserves a great deal of credit for recently directing the attention of the profession to the use of creasote in the treatment of phthisis. I remember that twenty years ago creasote was used exclusively in phthisis in connection with ferrous acids, but I have never obtained any specific effects from its use upon the phthisical processes. I am quite certain that it has no effect upon the tubercular bacilli or upon the tissue around the tubercle.

It seems to me to act simply to improve the digestive power of the patient and to arrest intestinal fermentations.

A. Jacobi, M.D. I beg the Chair's pardon for again taking the floor, but the subject is so important, and, at the same time, so interesting, that some remarks may be permissible.

Every medical study of any kind, if it be considered to be legitimate, must be conducive to the prevention of disease or to the healing of the sick. The observations made by Dr. Loomis

correspond in many points with observations that have been made before, but never better elucidated than by him, and they lead me to the suggestion that if we mean to cure we must contribute something to rendering bacilli innocuous. Dr. Loomis himself suggests that if we are to do anything in that line it must be accomplished by improving the chances for the formation of fibrous tissue.

Many of us have expected, some time ago, that tuberculin would have that effect. It appears to be the general impression now that when a small injection is made slight irritation results; when the injection is large there is so much congestion that not infrequently new inflammation will make its appearance, and hence the process goes on more quickly than if left alone. If we had safe means to produce fibrous tissues, we should thereby certainly contribute to the cure of local tuberculosis. Now, there are such means. If we have remedies that are tissue-builders, that means that they contribute to the formation of connective tissues. We know that some remedies exist having that property. They are arsenic and phosphorus. Both will irritate and contribute to the building of new connective tissue. Both will, though being vascular irritants, build up in small doses, destroy when given in large quantities. For twenty years and more I have used minute doses of phosphorus (not, however, the phosphates), for the purpose of more rapidly producing connective tissue in subacute and chronic cases of bone disease. In a large number of cases I feel positive that I have seen successes in a relatively short time. It is known that Wegner accelerated the formation of callus in fractures (experimentally), by such doses of phosphorus.

For the last twenty years or more I have used arsenic in pulmonary diseases with the intention, and I believe the effect, of increasing the amount of connective tissue. If so, the result must be that tubercles are encysted and thereby rendered innocuous. During that period I have treated almost every case with arsenic, frequently combined with digitalis among other things, and the result has been very fair. Phosphorus I have not used for that purpose.

- R. G. Curtin, M.D. I was the observer of some experiments made by Dr. Pepper in Philadelphia about eighteen years ago, in which he injected the tincture of iodine into and around pulmonary cavities. This appeared to cause some local disturbance, which was probably followed by induration around the cavities causing contraction. I have no doubt that this treatment hastened the fibroid process. Some years afterwards I was fortunate enough to be able to see the post-mortem appearances in three of these cases, which exhibited the peculiarities or characteristics spoken of by Dr. Loomis. Probably the benefit which was derived in some of the cases are described by Dr. Loomis in his very able paper.
- J. H. TYNDALE, M.D. I was delighted by Dr. Loomis's insisting on diathesis as a basis of cure, especially as to the rheumatic diathesis. Constructive and destructive metabolism I think would be more expressive terms to designate the individual tendency instead of fibrous and scrofulous. Constructive or destructive metabolism is inherent in the person.

## FURTHER CONSIDERATION OF THE ANALYSIS OF RECORDED CASES OF PHTHISIS PULMONALIS.

By S. A. FISK, M.D.,

In the summer of 1889 I presented to the Colorado State Medical Society an analysis of one hundred recorded cases, showing the effects of the climate of Colorado upon cases of phthisis pulmonalis, from which analysis I drew the following conclusions: "Taking cases as they come to us, we can expect improvement in two out of three; that men do better than women, as in fact they do anywhere; that persons over twenty years of age do better than under twenty, and that over thirty years of age do still better; that heredity, however, is no bar to a person's coming to Colorado, but that the more indirect the inheritance the better are his chances. Nor should a hemorrhagic tendency debar one from coming, as such cases do admirably well; that altitude per se is not a producer of hemorrhage; that the chances of obtaining an arrest of the trouble are improved by the patients possessing a sound digestion, a good appetite, and a pulse and temperature not much raised above the normal; and that patients in the early stages of the disease, especially if their digestion be sound, appetite good, and pulse and temperature nearly normal, are the fittest subjects for our climate, whether they have any hereditary tendency or not."

Very singularly my conclusions were corroborated by Dr. Solly, of Colorado Springs, in an article read before this association at its last annual meeting. From the analysis of one hundred and forty-one cases, coming under his observation, he likewise concluded that two out of three cases coming to Colorado received benefit, which result was all the more gratifying, as his work was entirely independent of mine.

Two years and three months have now passed by since I made my report, and it is my wish at this present time, so far as I am able, to bring my report down to date; an undertaking which I approach with some hesitancy, because of a dread that, after all, however conscientiously I may analyze the cases, my results may not do full justice to the curative effects of the Colorado climate.

At the time of my previous report I concluded that, of my one hundred cases, fifty per cent. were very much benefited by our climate; that there was seventeen per cent. additional of persons who showed improvement, although not equal to that of the first class; making in all, as it seemed to me, sixty-seven per cent. of cases that received a benefit by coming to Colorado. Of the remaining thirty-three cases twenty-six had died, and seven seemed to be positively worse than they were on coming. The intervening time of two years has simplified matters somewhat for me, as, so far as I have been able to follow the cases, I see either a positive improvement or a positive retrogression. Out of my one hundred cases, at the time of my present report, I know of forty-three deaths. There are twenty-four additional cases of which my knowledge does not extend up to date, leaving me with thirty-three now living, of whose condition I can speak with a certain degree of assurance.

If, now, we take the thirty-three cases, I find that thirty-two of them are so much improved that they have been able to take up the burdens of life again, either in Colorado or in their former locations, and so might fairly be classed under the heading of cured, according to the definition of Williams and other writers. The remaining one case is in a somewhat worse condition than when he came to Colorado, he being amongst the class that I formerly spoke of as somewhat improved; but, to offset his condition, I find that one whom I formerly classed as worse, is to-day very much improved.

Of the thirty-two, whose condition is improved, ten are now living at or near sea-level, and, so far as I can learn of their condition, are not showing any recurrence of symptoms, or experiencing much inconvenience, a fact which is of exceeding interest as demonstrating a point on which the profession is as yet divided, namely, with reference to the advisability of patients who have

received an arrest of their trouble in Colorado, returning to lower elevations. It hardly seems fair to me to class all of the thirty-two as cured, for, despite the fact that they are actively engaged in the duties of life, in some instances there are yet remaining cough and physical signs. Six of my list can be classed under this head, who, though able to work, are nevertheless occasionally subject to a recurrence of their symptoms, and at all times have to exercise a certain amount of caution. The remaining twenty-six, it seems, can be fairly spoken of as cases of cured, cases in regard to whom most persons would scarcely presume that they had ever had any pulmonary trouble, and who are able to go about their duties like other men.

If then we speak of twenty-six per cent. as the ratio of cured to be obtained from a residence in Colorado climate, it seems to me that we would hardly be doing the climate justice, inasmuch as some of the cases that have passed from our observation were, at the time they were last seen, such as might be fairly classed under the heading of cured. Of this number I can now recall six, which will bring my percentage up to thirty-two per cent., a ratio which I find is again confirmed by Dr. Solly's experience, as stated in his report to the Colorado State Medical Society, at its last annual session, and which is furthermore in accord with the results recorded by others, as the ratio of cures that may be expected from treatment in high altitude resorts.

In passing it may be permissible for me to state that of the twenty-four cases that have passed from by observation, I regarded the condition of twenty-two as very much improved, when last seen, and of six as so markedly improved as to warrant a return to their homes, and hence I have spoken of them as cured. So, if I should add these twenty-two cases to the thirty-two now under observation, and whose condition is very markedly improved, it would bring my percentage of benefited cases up to fifty-four, which, while it is somewhat less than the percentage which I had obtained on a previous analysis, will probably come nearer a fair statement of the case.

Of the forty-three who have died, two were doing remarkably well until attacked with an intercurrent disease which carried them off, leaving forty-one cases that in my best judgment died of their pulmonary trouble. An analysis of the forty-three cases shows the following results, which, it seems to me, will convey some impression of the effect of the climate of Colorado upon pulmonary trouble, and, in a somewhat negative way to be sure, will illustrate the class of cases that are suited to this climate.

With reference to the sex of patients, I find that of my one hundred cases fourteen were women, and of these eight died, leaving six unaccounted for but much improved. Of these, three are to-day living in the East and doing very well; one is in Colorado apparently cured of pulmonary disease, and two I have lost sight of. To reduce this to a percentage, it makes about fifty-seven per cent. of the female patients who have died, as against forty per cent. of the male; seeming to indicate, as my previous analysis did, that women do not do quite so well in this climate as men do, a result which probably will hold wherever pulmonary disease is treated.

With reference to the age of the patients, of the forty-three who have died three were under twenty years of age, making a percentage of one hundred of all my patients under twenty at the time of my first examination.

Of those between 20 and 30 there were 20 deaths, a ratio of 37.7 per cent.

which leaves me to infer that patients have a greater recuperative power and do better if the disease takes them between twenty and thirty than if it comes upon them when they are between thirty and forty, and that they do better in that decade than they do between forty and fifty; in other words, that under twenty they do not do well, and between twenty and fifty the chances diminish as they get older, a result which is not altogether in accord with my previous observations.

With reference to the question of inheritance, I find there were ten in whom there is a history of one or both parents having been affected with pulmonary trouble, one who had one or both grandparents affected, three who had uncles or aunts, seven who had brothers or sisters, and twenty-two in whom there was no history of inheritance: which goes to show that of the forty-three deaths twenty-one had a history of inheritance and twenty-two had not, making it about fifty per cent. in each case.

If now we compare the results with the full table of one hundred cases, I find that of the cases who had a history of inheritance when they came under my care, 40.7 per cent. of them died; whereas, of the cases who had no history of inheritance at the time of coming under my care, 45.8 per cent. have died, a result which goes to confirm my previous observation that heredity is no drawback to a person's coming to Colorado.

As regards hemorrhages. Of my total number of one hundred cases forty-four had a history of having had one hemorrhage or more previous to coming to Colorado. I find that of the forty-three deaths, ten of them can be directly attributed to hemorrhage, and of these ten it occurred in two cases where there had never been any previous history of hemorrhage. This would make a percentage of 18.6 of such persons who came to Colorado with previous histories, which goes very conclusively to prove the statement made in my previous article, that this climate is not a producer of hemorrhage, and that, contrary to a somewhat general belief, hemorrhagic cases do admirably well here, a result which is confirmed by the observations of Dr. Jacob Reed, Jr., of Colorado Springs, as is outlined in an article read before the Colorado State Medical Society several years ago.

I find that of the forty-three cases who have died, in eleven the appetite is stated as having been very good, fair in another eleven, and positively bad or wanting in twenty-one. The digestion was very much impaired in twenty, and the action of the bowels irregular in fifteen, which would lend some credence to the belief that the condition of the patient as regards perfect or imperfect assimilation is a very considerable factor in the prognosis, those doing best where the appetite is good, the digestion perfect, and the bowels regular; and, on the other hand, those doing poorly where the appetite is wanting and digestion imperfect.

As regards pulse and temperature of the forty-three fatal cases, there were twenty-three in whom the pulse ran from 100 to 130 per minute and whose temperature was from 100° to 104.2° at the time they first came under my observation. In six of the cases the records are wanting, whereas of the remaining cases the

temperature and pulse varied but slightly from the normal, showing that irritability of temperament, as indicated by temperature and pulse, is an unfavorable indication with reference to prognosis.

With reference to the condition of the lungs at the time of coming under my observation, I find that of the forty-three cases, thirteen may be classed as having been in the first stage of the disease, nine in the second, and twenty-one in the third, a result which is in accord with the usual experience that high altitude treatment is better adapted to persons in the earlier than the later stages of the disease, especially if the slight amount of trouble be accompanied by good digestion and very little nervous irritability, as shown by the temperature and pulse.

The results as a whole, it seems to me, can fairly be taken as corroborative of the conclusion that I drew from my previous analysis, which conclusion I have quoted at the opening of this article.

### DISCUSSION.

- J. H. Tyndale, M.D. I would like to hear further about the deaths from hemorrhage. Dr. Fisk speaks of twenty-two per cent. of his cases having died from hemorrhage, which seems so remarkable that I would like to know whether he attributes those deaths to hemorrhage directly and immediately, or whether death was in consequence of many hemorrhages, or how.
- S. A. Fisk, M.D. I shall have to consult my tables again to fully and accurately answer Dr. Tyndale's question. I recall one patient who died of hemorrhage and was found after the intermission of a night; but my cases are not all of that character. They include those as well where, I think, the hemorrhage led indirectly to death, as the patients never seemed to revive after the hemorrhage. In such cases the patients seemed to be doing pretty well up to the time of the hemorrhage, but from that time they ran down quite steadily, never again recovering. I have included those cases, so far as I could judge, in my tables.

# THE CLIMATE OF THE GREATER PIEDMONT AND MOUNTAINOUS REGIONS OF THE SOUTHERN UNITED STATES.

By W. C. VAN BIBBER, M.D.,
BALTIMORE.

THE object of this paper is to call attention to a region of our country, the climate of which has not yet been described as a whole. It may be better to attempt a description in a general way, and as a whole, because there are circumstances in the history of a portion of this territory by which it is known as a distinctive region; and the whole section has marked peculiarities of land-formation, air, and climate.

A distinction will be made in the description between the words climate and air; and for the definition of these words reference will be made to the most recent dictionaries (Billings's, Webster's, Ainsworth's, etc.). In treating such widespread subjects as air and climate it is easy enough to digress; but to take the harder way, and to keep closely to the definitions to which reference has been made, would be simply impossible for the region under our notice, because the extent of country is too great, and there are but few data upon which to base statistics. There are several signal-service stations, with volunteer and agricultural experiment stations established by the National and State Governments scattered throughout this region, the officers of which are always willing to give any information in their power, yet such information could not be relied upon in treating of the climate in a general way.

The description of special climates is generally given by means of tabulated and comparative statements of the thermometer record, the range of the barometer, the dryness or humidity of the air, the force and direction of the winds, etc. For obvious reasons this

plan will not be attempted here notwithstanding the facilities which have been mentioned. In treating this region as a whole, my argument will rather be to show the appearance as to health, and some of the prominent characteristics of its inhabitants; and then to apply a few of the well-known principles which govern the air and climate of all regions to this distinctive locality.

There is no doubt of the fact that climate and scenery have much to do in the formation of human character; and people without knowing it absorb to a great extent the physical attributes of the place in which they live. The most correct description, and the truest appreciation of the climate of any region may be obtained from the appearances presented by its inhabitants. If their faces are happy and tranquil, it is evident that life is pleasant and sweet; if they are industrious and ambitious, contented and satisfied, healthy and beautiful, then it may be inferred that the climate is a good one. Should, however, the reverse appearances maintain for any region the reverse opinion would be given. Surely it is a true philosophy which will judge of the physical surroundings of men by their appearance.

There is the authority of Mr. Henry Gannett, the learned geographer of the United States Geological Survey, for saying that, "the area which is usually defined, at present, as the 'Piedmont Region of the South,' is bounded on the northwest by the Blue Ridge and on the southeast by the Fall line, which passes through Washington, Richmond, Columbia, Augusta, and Macon.

"It is underlaid in the main by granitoid rocks. It rises from an undulating surface in the southeast to detached ranges, terminating in the Blue Ridge on the northwest, and has an elevation of three or four hundred feet on the uplands in the southeast to more than four thousand feet."

This description covers the length and extent of the foothills south of Mason and Dixon's line, east of the Blue Ridge Mountains. There is, however, a piedmont region west of this, extending into Alabama as far as Birmingham and Anniston to which a large emigration is progressing; and yet another region extending along the west side of the Appalachian range, both of which are well worthy of attention. The same general principles govern

the changes in the climates of all these regions, and therefore it is proposed to treat of them as a whole. Whatever information may be obtained or imparted bearing upon them, it is hoped may be well received, because a large emigration is now tending in this direction.

If one stands before the map of the United States issued by the Department of the Interior, which is compiled from actual surveys and is most correct and authentic, it will be seen that the north boundary of this region extends along Mason and Dixon's line which in round numbers runs nearly along the 40th degree of north latitude; and thence along the boundary between Pennsylvania and West Virginia to the fall of the foothills of the mountains of that State. Its western boundary includes the foothills in Alabama and running north through East Tennessee, East Kentucky, and West Virginia.

It lies across the country in a southwesterly direction; the head or eastern portion of it being nearly on the same longitudinal parallel with Washington, and the southern extremity being nearly 10 degrees further west. It runs nearly parallel with the Atlantic coast, and comprises an area of about seventy-five thousand square miles.

Almost within our own knowledge this region has been twice peopled: first, by the Indians; and, second, by the present white inhabitants. Of the Indians the principal tribes were the Catawbas and the Cherokees. Of these the Catawbas were not properly a Piedmont tribe. The Cherokees have been represented by the historians of the various war-campaigns made against them, as brave and powerful warriors, intelligent, subtle, and ingenious in supplying themselves with food in times of peace. They were grain-feeders and descended from the Iroquois. their defeat by the army under Gen, Andrew Jackson, most of them were removed to more western reservations. Those that remain, however, known as the "Eastern Band of Cherokees," and numbering about three thousand souls, are said by Mr. James Mooney, of the Bureau of Ethnology, and by Dr. Washington Mathews, U.S. A., to be healthy and capable of enduring much exposure and the fatigue of long walks and mountain

climbs. They compare very favorably, by ranking higher in health, than the fish-eating Indians along the sea-coast.

The origin of the white people of this region seems to be almost as mysterious, in another way, as that of the Indians. Let the Rev. Mr. A. D. Mayo, of Boston, tell the result of his study after a residence of ten years amongst them. He says, "How the strange population of this great central mountain world, near two millions at present, was formed nobody seems to This region was a mysterious no-man's-land till the enterprise of the last twenty-five years revealed it, with all its natural sublimity and beauty, and its industrial importance, to an astonished world. A most interesting fact for the historical inquirer is the explanation of the origin of the southern white people, and the romance of the reality will eclipse the glamour of rhetorical mist in which the origin of this section has been involved." According to the same authority, however, no matter where they came from, the present inhabitants of this region seem to have grown up with the climate, the air, and the soil with its varied products, to a high place in political and industrial importance. Here was, and is now, the headquarters of what is termed the "Third-Estate of the South, which came in time of war, like a mighty apparition across the southern horizon"

In order to show some of the effects and prominent laws of climate let Mr. Mayo tell what they did: "In the late war," he says, "they were patriotic beyond all other sections. One hundred and forty thousand white soldiers were enlisted from this region. Twenty-four thousand more than from Vermont, New Hampshire, and Connecticut. Seven thousand more than from nine of the present Northwestern States. Eastern Kentucky gave more white soldiers to the Union army than its entire number of voters." The presidents of both the contending sections came from this region, as also a large number of the most distinguished generals and rank-officers. Even in the ante-bellum period the author of the Declaration of Independence, the fourth president of

<sup>&</sup>lt;sup>1</sup> "The Third-Estate of the South." Journal of Social Science, Saratoga Papers of 1890. By A. D. Mayo, D.D.

the United States, and many renowned statesmen came from this section. The first president, the Father of his Country, ever kept his sagacious and practical eye upon the deep valleys of the Kanawha. These individual illustrations are given only to show the real relation of man to his surroundings, because such a record of inhabitants during three distinct epochs, it is believed, point conclusively to an invigorating climate. There is now a steady emigration from the North, South, East, and West to this great region. Maryland is its principal gate through Baltimore and Washington from the North and East; the approach from the South is through Atlanta, and through Louisville and Cincinnati from the West.

In the old South slavery did not take root in this region as it it did in the lowlands around it. This peculiar institution shaded off with the slope of its mountains and foothills towards the East, the South, and the West, obeying in this the well-known climatic law, which is common to all mountain regions, that slavery does not flourish among the hills. Besides this, according to another law touching climate and the races of men, there is no necessity, in justice, for the presence hereafter of any other race than the white people in this climate. This is said on account of the great contentions already going on in the Southern States amongst those of different colors and races. The pigmented races flourish equally as well or better elsewhere; and if the white population of this region recognize fully the value of the climatic law which has been given, and promptly act upon it, they will surely pursue a far-seeing and a proper policy, which must add much to the prosperity and happiness of both races in the future by freeing them from all color and race contentions. If there be no mistake in any of the statements which have been made; if the climatic laws as advanced are admitted; if they are all conspicuously true, then it may be said, philosophically, that the great war through which we have passed was, to a considerable extent at least, begun and ended by identically the same genius that brings us together here to-day—the effects of climate upon man—and that this region played no inconspicuous part in its history.

There are, however, certain other atmospheric laws which, when applied to this region, will explain some of the prominent

characteristics of its climate. One of these is a well-established law, that a residence in a moderately-elevated region—that is, on a plane of the atmosphere a few hundred feet above sea-level—is more healthy than the tide-water lands, especially in a warm climate.

- 2. As we ascend above the sea-level, the mean annual temperature of the atmosphere falls at the rate of one degree for every three hundred feet of ascension.
- 3. Going towards the North, each geographical degree represents at least one degree of colder mean annual temperature Of course, these figures are not held as exact in all cases; they are only approximate; yet there is a long experience to confirm their general truth. "The chief factors that determine and modify climate," says Dr. J. M. Toner, "are latitude, altitude, distance from the sea-coast, mountain ranges, and inland lakes. These are positive elements, and very regular in their influence upon climate."

Nearly one-half of the surface territory of Maryland, Virginia, North Carolina, and Georgia has an elevation of less than three hundred feet above the sea-level. From this plane the land rises by terraces until it reaches the Appalachian range, the average height of which is estimated by Dr. Toner to be about two thousand four hundred feet—not high enough to influence the climates of the plains on either side by snow-clad peaks or chilling winds, but sufficiently high to give to the region itself a cool, salubrious, invigorating, and healthful climate.

Starting from Baltimore, which is the gate to Harper's Ferry, the north entrance to this region (the first of the terraces, going towards the northwest) is Parr's Ridge, about eight hundred feet high; secondly, the Blue Ridge Mountains, about twelve hundred feet; then the Appalachian or Alleghany Mountains, the highest peak of which, in this State (Maryland), is about four thousand feet.

Probably the best way to present the climate of so large a region as this, especially where it is homogeneous, is to bring

<sup>&</sup>lt;sup>1</sup> Dictionary of Elevations and Climatic Register of the United States. By J. M. Toner, M.D., Washington, D. C.

prominently forward the fact that in all piedmont and mountain countries topography gives many different climates, even in the same latitude of the same range. This results from the circumstance that the hills and mountains lie zigzag upon the surface, so that every possible inclination to the sun may be obtained; also, every degree and prolongation of shade in the morning and in the evening, when the long shadows fall from the neighboring mountains. In all mountainous regions situations may be found that are protected from or exposed to the winds from every direction, so that all these accidental circumstances give different temperatures and humidities to each spur and every valley in the range.

Among mountainous countries, the Alleghany or Appalachian range has its individual peculiarities. Extending as it does in v southwesterly course, nearly parallel with the Atlantic coast from Maine to Alabama, it is eleven hundred and fifty miles long, and from one hundred and fifty to two hundred miles broad. The highest peaks are found near the two extremities—the one in North Carolina, nearly seven thousand feet high; the other in New Hampshire, over six thousand feet high. The region under our consideration, however, extends from the fortieth degree of latitude. South of this, latitude has even more to do in modifying the climate than in the northern part. In the mountains and foothills of Pennsylvania, New York, Vermont, New Hampshire, and Maine, the climate is delightful in summer, but the winters are too rigorous for profitable agricultural pursuits. As a residence for the year round, they bear no comparison to the foothills and mountains of Alabama, Georgia, East Tennessee and Kentucky, West Virginia and Maryland. In these States no two spurs or valleys seem to have exactly the same climate or to give the same flavor and luxuriance to the products of the soil.

Another way of forming a correct idea of this region is by comparing it with other piedmont and mountain climates. In Europe those somewhat in the same latitude—that is along the fortieth parallel—are in Portugal, Spain, and Italy. In these countries the hill and mountain climates do not materially differ from those in the Appalachian range to the South. The mountains of this range are not so high and imposing as those of the Alps, and are not above the snow-line. The valleys are broader,

more fertile and productive, and the landscapes are more smiling and extended. There are no lakes in the Appalachian range, and this gives it at once a singular peculiarity, which, while it may detract from the variety and romance of its scenery, yet, at the same time, may have some effect upon its general climate.

Compared with the Rocky and Sierra Nevada mountains, in the same latitude, the climate and scenery are in yet more marked contrast. The mountains are not so high; the foothills are shorter; the valleys and parks and cañons are more compact than these Western mountains, and the land is more fertile; the air is less rarified; the dew-point and rainfalls are different. For these and other causes, the two climates are dissimilar. So much has been written concerning the climates of Colorado and California, below the fortieth parallel, that the contrast need not be continued further.

Concerning the kind of air found over the piedmont and mountain regions of the Southern States, it may be said that as it is far removed from the ocean, the air differs from that of the sea. It also differs from that of the sea-coast, and from the plains known as the Atlantic slope. Nor is it the same quality of air which is found in the great basins of the Ohio and Mississippi valleys. Standing upon a plain higher than any of those lands, the difference in the air is immediately appreciated by the personal sensitiveness of those who come upon its surface. The air also shows entirely different phenomena from that in the low-lands. One striking peculiarity is the absence of what is known as the ague and fever, or the intermittent and remittent malaria.

The Celli, Laveran's, or Counselman's parasitic organism, so widely spread in the lowlands, has not yet been wafted to or found lodgment in the air of this piedmont or mountain region. According to the map for consumption, published by the United States Census Bureau, the tubercular bacillus (Koch's) does not exist in some portions of this region. The white spot upon the map of the Census Bureau, marking absence of this organism, is found in East Tennessee and West North Carolina, and radiating from this central point the shading of the map is light from Alabama to West Virginia. It is claimed that the typhoid-bacillus is found here as well as upon the prairies of Michigan, but the individual

differences between the two bacilli, if any exists, has not yet been shown.

Treating the climate of this great region as a whole is only admissible because of the sameness of the climate. It does not nor is it intended in any way to forestall or conflict with more special or detailed descriptions of the climate of any of its parts or sections. It has already been said that almost every available residential situation has its own peculiar points of excellence or discomfort, and these must be studied. Personally, I have been in many different parts of this region, and I believe that, allowing for latitude, it has, in a general way, a homogeneous air and climate throughout its entire extent. Its chief characteristics are that it is variable, like other mountain climates; but that this variability is much modified by the moderate height of its hills and mountains. That it is an invigorating and a healthy climate, proof has been offered by a description of three different sets of inhabitants at different epochs. Owing to its topography, any plane for the situation of a residence may be selected, varying from one thousand to several thousand feet above sea-level, and almost any presentation to the sun can be found. One may place his house and plant his vineyard and fruit-orchard away from the force of the north or west winds, and keep warm during the winter by locating in sheltered valleys, or on the sides of hills smiling to the south.

In conclusion, permit me to say that the mountain and piedmont region of the Southern States have climatic and other advantages of peculiar interest. Although much nearer to the cities and people of the Atlantic coast than the foothills and mountains west of the great basin of the Mississippi River, they have not excited, or as yet received, as much interest or study as the Western mountains. The chief attraction to them at present is their untold mineral wealth, which is being rapidly developed. My argument is that this region has many points of attraction connected with its climate, and other resources supplementing its climate, which will be briefly enumerated. The purity of its air, free from periodic fevers, and its comparative freedom from consumption have been mentioned. The climate is bracing and exhilarating, the scenery pleasing, the

land is well watered and the soil fertile, producing food and fruits necessary for the maintenance of a large population without much trouble or expense; its mineral and medicinal springs are numerous, with many well-built health-resorts already improved. Its forests are valuable; upon its surface in some parts there is a natural growth of blue grass (poa compressa), which, beyond all competition, brings the ruminating and gramivorous animals to their greatest perfection. In its streams swim fresh-water fish of good quality, and, although remote from the sea, it is becoming each year more easy of access by means of railroads penetrating it in every direction. The climate of the Appalachian region under consideration is eminently variably.

Sometimes there is cloud and sunshine, heat and cold, winds and calms, drouth and rain, all in one day. There have been those who thought that this scene of perpetual atmospheric vicissitudes not only steels us against their effects, but proves an unceasing stimulus to activity of body and mind, and, consequently, to vigor of constitution. There are those who look for more equal climates for the benefit and pleasure of certain individuals, and for the cure of some diseases. One great desire of the present day is to find a dry and equal climate. For this the search is being diligently made with ingeniously invented instruments. Such a climate is wanted, and is a desideratum for a restful, soothing, and healing treatment for many nervous and malignant diseases-for consumption and other wasting and anæmic affections. Such a climate will not be found in the region now before us. In this country one must go to Coronado Beach, Cal., or Point Pinalos, Fla., to find the nearest approach to a mean annual temperature within or about the seventies. The climate of piedmont and mountain ranges having moderate heights, is only recommended to maintain the strength of healthy, strong, and vigorous persons, who can withstand vicissitudes, and delight in such changes amidst beautiful scenery. It is not recommended for the cure of any special disease, nor for the relief of any abnormal condition; but it is recommended as a climate for the strong and vigorous who wish to retain these characteristics in future generations. It has not been presented

in the strained language of poetry or hyperbole, but an effort has been made to describe the climate pure and simple as it exists. So far as the history of its inhabitants has been given, it has shown itself to have been the cradle of intelligent and powerful men and women; people who appreciate the glow of patriotism, the power of wealth, the animation of life in a pure air. They seem content in the pleasure of passing this life amidst ennobling scenery, surrounded by everything which enhances happiness by promoting the health of mind and body. It is believed that in time to come this region will turn out to be the centre of a powerful population, for the air and climate have already been proved to be replete with courage and patriotism.

### DISCUSSION.

DR. KARL VON RUCK. I can confirm what Dr. van Bibber states, in regard to the absence of consumption and malaria amongst the natives of the Asheville plateau, which, however, is beyond the piedmont section; but I can hardly agree with him when he says that this climate, which produces such vigorous people, etc., could not be made use of in the cure of disease. In the region where I come from we do make a good use of it in the cure of consumption. In other respects I can heartily indorse the doctor's statements and conclusions.

## EPIDEMIOLOGY OF INFLUENZA AND ITS RELATIONS TO CATARRHAL FEVER.

By ROLAND G. CURTIN, M.D., AND EDWARD W.WATSON, M.D.,

The influenza of 1889 and 1890 presents to the medical inquirer several problems of extreme interest; and, in studying its climatological relations, these necessarily rise into prominence. Whatever may have been its course elsewhere, the first question of importance from our local standpoint must be, When did it first begin in Philadelphia? Now, to this, almost a universally unanimous answer may be expected, if we inquire of current medical literature and the daily press. All speak in the same voice; all answer, in the late fall and early winter of 1889; but we imagine that further thought and a little investigation will somewhat modify this.

From the summer of 1888 there undoubtedly prevailed in Philadelphia—to go no further than our own immediate locality a distinct, unique, hitherto unknown catarrhal affection, a fever which seems, so far as medical reports go, to have passed unobserved. Often of long course, characterized by localized but peculiar catarrhs of various organs, it became lost in the old nomenclature of well-recognized diseases. As pulmonary catarrh, it became to the dull-eved medical attendant only the catarrhal pneumonia known to him of old; yet he wondered to himself why so often, with the disappearance of all physical signs in the lungs, the fever and the great prostration still persisted. As catarrh of the liver it furnished him with peculiar cases of bilious fever and catarrhal hepatitis, and in the kidneys and bladder he promptly gave it the old names, ticketed it, and mentally pigeon-holed it in the old receptacles. As a continued fever with abdominal pain, dulness and sometimes diarrhea, typhoid

seemed to him a happy diagnosis; and when that mysterious gland, the pancreas, was sore and painful and all digestion seemed arrested, all capability of taking food gone, visions of abdominal cancer obscured his otherwise serene mind, and the case as it slowly recovered seemed emerging from the jaws of death through his brilliant ministrations.

When, however, we study this complete disorder, which to the careful observer was wide-spread and prevailed almost throughout the year, we are forced by relentless logic to confess that between it and the influenza of the two succeeding years, there was absolutely no difference other than that which is constantly to be met with between the explosive epidemic and the same disorder, less prevalent, endemic, and feebly feeling its way preparatory to a general onslaught on the community. A familiar instance of this may be met with in the difference between sporadic and epidemic cases of cerebro-spinal meningitis. It is also strongly corroborative of this that, in the past year and the late winter, influenza, unlike its history of the preceding year, has tended more and more to return to that form in which it commenced, and has presented many cases undistinguishable from those before mentioned as occurring in 1888 and its winter, which for want of a better name we must term the "Catarrhal Fever." For a catarrhal fever is well known, has for many years possessed a name and place in text-books, and a study of its symptoms and history as therein described will convince the reader that it is but a feeble imitation and copy of the disorder to which we have alluded as new to the experience of the practitioners of to-day. Yet in the past influenza has acquired the name from the experience of previous epidemics of "Epidemic Catarrhal Fever."

The first distinct cases of this catarrhal fever were seen by the writers in 1888, in the summer and early fall. They were brought to the city by the returning tide of summer absentees, and were probably contracted at the seashore (the catarrhal region), and at resorts on river sides. Some had so travelled from place to place that it was impossible to locate any actual reception of the disease in any particular locality, but the cases seen were at first all among those who had recently travelled.

As the warm wet autumn of 1888 progressed, many more cases

appeared. So far as the writers are aware, these were to a large extent among the well-to-do class of the community, but many had not left the city for years. It would have been of interest in this connection to have traced up any possible communication between these and the earlier cases, but this was not done at the time, and later was for obvious reasons impossible. The only observation bearing on the point was in regard to the first case seen in the latter part of August. This patient had remained in Jacksonville. Florida, until quite late (in the vellow fever year), had then returned to the city, and had subsequently visited the Atlantic coast—Cape May and Atlantic City, and then the Delaware Water Gap, at which latter place she was taken sick and brought back to Philadelphia on August 23d. The case was characterized by hepatic catarrh and some jaundice, urticaria, gastric catarrh, pulmonary catarrh of the peculiar character so well known afterwards in connection with influenza, catarrh of the kidneys and bladder with retention of urine (a very significant symptom), and the characteristic delirium. tracted recovery, which was complete by about October 15th [nearly two months], five cases occurred in the square in which this patient resided—all on the same side of the street, and grouped on either side of the house occupied by this lady. The cases were very similar in general character, and in two instances proved fatal, these two being over eighty years of age, and unacquainted with the first case, and had neither of them been out of town for years. This pointed to contagion. An investigation of the after history of the cases of 1888 and 1889, shows that they escaped almost entirely any attack of influenza. Often they alone of whole families in which they lived so escaped, leading us to surmise that the early catarrhal fever was the complete disease, and left on recovery no vulnerable, because no unaffected, organs. A still further observation bearing upon this point is that an investigation of cases of influenza occurring in two succeeding years in the same individual, shows that rarely if ever has the second attack affected exactly the same group of structures as the first. In the numerous cases where many relapses, so-called, occurred, each relapse was a distinct new attack of a new internal organ or system, or of distinctly new tissues of the organ previously affected. This was especially noticed of the lungs, and held true wherever a clear account of all the attacks could be obtained.

In regard to atmospheric causes, we may say that neither heat nor cold in themselves aggravated the disease or the liability to attacks. Changes certainly did, if accompanied by a damp atmosphere. East and northeast winds and storms caused the sick list to augment, while sudden dry heat and dry cold caused respectively an arrest of the epidemic, and its subsidence. This was true unless there was reckless exposure in an exhausted condition of the nervous system.

Where did the epidemic originate? Early rumor said in Russia—yet more thorough investigation located it in China; but if we take the case of Russia, where the first cases were said to have been observed in October, 1889, we shall find that in Spain, France, Germany, and in the United States it also was said to have appeared as early, and, as we have pretty well proved above, it existed here for a year or more before that, in this peculiar febrile form.

A somewhat cursory inquiry has convinced the writers that at least through the Eastern States it was quite common in North America, and as commonly misunderstood. On the continent of Europe something of the same sort seems to have prevailed in France and Germany, and along the shores of the Mediterranean. Especially was it noticed at Malta, where under the name of Malta Fever it received an investigation and report from a parliamentary committee, being supposed to be an outbreak of the enteric fever prevalent there before certain sanitary work was completed. A perusal of the symptoms and course of this fever. as given in the report alluded to, served to show that it coincided closely with the disorder under notice. We would suggest that thorough and concerted investigation would prove that catarrhal fever occurred in many parts of the world during the spring, summer, and fall of 1888, if not earlier. A very slight comparison reveals that the influenza of the succeeding year resembled very closely the catarrhal fever we have described—so closely in fact that on comparison the conviction is inevitable that they are one and the same disease, one in the sporadic form, the other epidemic—and, in searching for causes, what more probable than

that the one is the outgrowth of the other; that a year of mild wet weather in winter allowed the disease to slowly disseminate; and that, leaving its germs behind it, the succeeding mild and wet summer, fall, and winter allowed them to increase and mature to gigantic proportions? It is impossible to believe that influenza travelled here from abroad after its reported outbreak in Russia and Germany. The Russian authorities report it as spreading in Russia from St. Petersburg, both west and east, from about October 15, 1889.

In Germany many observers are sure that they frequently met with cases in October. In France and in America the same observation was made. To go no further than the writers' observations, cases were certainly seen, and in considerable numbers, presenting all the marked features of the disease from September 1, 1889, onward. Groups of cases, in which the disease ran through whole families, occurred through October and November; and by November, when the press was announcing its spread in Europe and threatening its advent among us, many practitioners found their work already doubled or trebled with cases which corresponded exactly in every minute particular with what afterwards came to be called influenza or "La Grippe."

Now why, the curious inquirer will ask, did the disease spring into notice so suddenly? Probably because all over the civilized world the weeks preceding Christmas and the Christmas holidays are marked seasons for crowds to congregate, purchasing, visiting, and attending entertainments, and because the warm and moist atmosphere was universally present throughout the civilized world. It filled the Atlantic with fogs from excessive ice, prevailed all over Western Europe and Eastern America, and was evidently the result of changed terrestrial climatic conditions, embracing at least three years. It was because the poison was already everywhere, and the bringing together of great numbers of people in contact with cases already suffering, and under conditions of moisture and crowding, accounts for its rapid outburst; and we have sufficient evidence during the last two years that it can lurk in the system, in a latent condition, only requiring proper conditions to develop it.

Viewed in this light, influenza is shorn of its mysterious

and awesome characteristics, and may be conceived of as an obscure disease spreading slowly over the world, lurking in the guise of other affections, or as developed originally in many places at once from causes brought into activity by wide-spread climatic conditions. Had the summer of 1889 been dry with hot high winds, had the autumn set in with early and sharp frosts, the disease might have disappeared entirely: for, whether of local origin in each place or imported from afar, when developed it shows strong evidence of being contagious, either directly or indirectly. Either the contagion is so far-reaching as to be untraceable, or it occurs in some common but unsuspected way. as in cholera or typhoid, or it is a contagion or infection to which the individual exposed is everywhere non-resistant and excessively sensitive. We confess that its progress in some respects resembles yellow fever and dengue—diseases which extend from place to person rather than from person to place—but other facts militate against this view.

Hence the fact of the outbreak of influenza among comfortable classes, these being more brought together than the abject poor at the beginning of the holiday season. In this it would but follow the laws of epidemic outbreaks—as illustrated so vividly in cholera, for cholera undoubtedly exists before the annual gathering of pilgrims at Mecca, the gathering of crowds and the consequent unhygienic conditions fermenting and spreading the poison. If, however, we should desire to trace the epidemic of influenza a little further, and ask from whence it was brought to Russia and Europe, perhaps some light may be gained from a study of Australian medical journals. From these we learn that there was prevailing in 1884 and 1885 in the winter season, which occurs during our summer, a wide-spread and serious epidemic of influenza, presenting (as shown in a careful study of the disease by an Australian physician, which was published early in 1889, before our epidemic was under way) all the symptoms with which we are now so familiar. It appeared in the cold wet season of 1884 and 1885, 1886, 1887, 1888, and 1889, and was at the date of the reading of the papers still in existence. Doubts on the subject of identity between the Australian and European epidemics will be entirely dissipated in reading the papers to which we

allude. In "Notes on Typhoid Fever," by G. W. Spring-Thorpe, M.A., M.D., M.R.C.P., London, the discriminative diagnosis between catarrhal fever and typhoid is carefully drawn. Another paper on "The Nervous Substratum of Influenza," by the same writer, both of these being published in the Transactions of the Intercolonial Medical Congress of Australasia, were read at the meeting held January, 1889, and published in the same year, at least eight or ten months before its advent here. From the experience of Australia, as narrated in these articles, we should strongly incline to the opinion that we are vet to have another year or two of the present epidemic, and that another winter will witness some further modifications of its symptoms. Just as the catarrhal fever characterized its first unnoticed year, as the fulminat type characterized the second, and the nervous and abdominal cases predominated in the third, so should we expect in the fourth winter to witness a preponderance of cases characterized by throat symptoms, easily confounded with diphtheria, but with softer and more superficial exudation, or a mingling of these cases with those exhibiting cerebro-spinal symptoms. We say this because in Australian experience the kind of cases which have manifested themselves in the late spring have predominated in the succeeding winter, and we have vet to experience many cases of the two types we anticipate, although there they have occurred.

Catarrhal fever often seems to have been noticed in past times as a precursor of influenza. An investigation of the literature of past epidemics discloses the observation that catarrhal complaints were frequent for a good while previous to its general onset. From this very fact influenza was called "Epidemic Catarrhal Fever." Stagnation of the atmosphere, absence of winds, prevalence of damp and warm winds, fogs (in Australia the common name for influenza is "Fog Fever"), continuous rains, all these have been noted, and the interesting question arises, Have these epidemics coincided with two consecutive warm, wet years? A careful study of what meteorological records the past has left us might throw some light upon the subject. There is, however, reason for thinking that other local epidemics of influenza have occurred after just such local climatic conditions. In the present instance an extremely wide-spread area of epidemic would demand

an equally wide-spread climatic alteration, the cause of which must be looked for in the extreme north or south.

A brief description of the salient points in this catarrhal fever is as follows:—

The disease began insidiously as a rule, but sometimes, after unusual exposure, there was an initial chill, which was described by those personally familiar with malaria and dengue as due to one of these diseases. These cases were in the minority, and generally some specially exciting cause for the chill could be discovered. Sometimes it began as a mild sore throat, the fever continuing after the subsidence of the local symptoms. The suspicion of malaria was sometimes heightened by jaundice and other mild hepatic symptoms, as mental dejection, vellow and furred tongue, slight tenderness over the right hypochondriac region. Often it was noticed that the disease attacked the system seriatim organ after organ. The succession in which the organs were attacked was not necessarily the same. Where symptoms of catarrhal pneumonia were present, that disease was suspected as the cause; where the bowels were affected, typhoid fever was simulated, suspected, and perhaps generally diagnosticated, and this suspicion was increased by the appearance in some cases of an eruption on the abdomen, sometimes on the thighs, arms and ankles, and in some rare cases over the whole surface of the skin. This eruption was rarely papular, often acuminate, irregular in margin, generally irregularly ovoid, varying from mere points to a size larger than the rose-colored spots of typhoid fever. They came in crops, occasionally concentric, became very faint on pressure, and in the early stage entirely disappeared. This eruption was seen not only in the catarrhal fever, but in diphtheria, in meningitis, after rötheln, and other eruptive and non-eruptive diseases.

In some cases the attacks of different organs were separated by a period of marked sub-normal temperature. Generally, however, the fever was continuous for from two to five or more weeks. In intestinal catarrh, the abdomen was more or less tympanitic, sometimes painful on pressure, gurgling might be produced at times at any point. The stools were mucous or mucous and bilious, "pea-soup" discharges, or yellow but not ochreous in color. Men-

ingeal complications were more frequent than in any other febrile affection, and were the cause of most of the deaths. Heartfailure was almost the only other cause of death noticed; but the general mortality, considering the severity of the symptoms, was slight. Most of the cases were from ten to twenty-five years of age; some few aged and very young were attacked. It was a common remark among physicians later on in the epidemic where catarrhal enteritis was developed, that "the 'Grippe' had run into typhoid fever."

#### TEMPERATURE OF CATARRHAL FEVER.

One of the most striking proofs of the identity of catarrhal fever with acute influenza, is shown by a study of the temperature. Charts of catarrhal fever show that in the vast majority of cases, the initial temperature exactly corresponds to that of the explosive form of influenza; suddenly rising from a normal or sub-normal to 102° to 104° F. It falls rapidly the next day to a point just above normal (instead of below, as in acute influenza), varying in different cases, however, and continuing on nearly the same plane, with only moderate variations for two, three, four, or even ten weeks; finally falling to sub-normal, often as low as 95° or 96° F., and then rising gradually to the normal—this fortelling rapid convalescence, with the exception often noted, that a very low sub-normal temperature, suddenly attained, portended a relapse.

In some cases the fever seemingly aborted from time to time, and returned, like the relapses of influenza. Some cases rarely ran above 100° at any time after the initial rise; while others continued on a higher range, from 100° to 104°. In quite a number of cases, when the temperature was taken day and night, the highest point attained was between twelve and two o'clock in the morning. Quite a number showed on the third day a second rise, which subsided by the fourth day to the second day's temperature. These cases were often diagnosticated as typhoid fever following influenza.

THE PROMINENT POINTS IN THE DIFFERENTIAL DIAGNOSIS OF CATARRHAL FEVER.—The small amount of emaciation after prolonged fever and the rapid recovery distinguished it from other

continued fevers of long duration, as also the complete absence of sequelæ, resembling in this respect only ephemeral or simple continued fever. The tongue resembled that of almost every other condition from that of low fevers to that of the large, flabby, white tongue of acute indigestion. The almost constant peculiarity was the enlargement of its papillæ and its moisture. Sordes were absent. The facial expression was never anxious, but easy, except where marked meningeal complications existed. Sometimes the face was bloated. The flush, which was rare on the cheeks, was slight and never circumscribed. The conjunctivæ were frequently congested. The stools were not of the ochreous color of typhoid fever, but were mucous when diarrheæ was present, and darker or lighter in color than true typhoid stools.

Constipation was frequent, late in the disease it was almost constant. Subsultus was infrequent, and there was no carphologia except in meningeal cases. The loss of hair after recovery was slight, when one considered the prolonged high temperature. Similarly the nails showed very little grooving. This undoubtedly was due to the slight impress made by this disease upon nutrition.

[In recent medical journals we see noticed a disease prevalent in some districts of the South which they call "the sweating fever." Many cases of catarrhal fever would suggest this cognomen, and perhaps this is its diagnostic solution.]

### NERVO-VASCULAR DISTURBANCES IN UNACCLI-MATED PERSONS IN COLORADO.

By J. T. ESKRIDGE, M.D.

NERVOUS and vascular disturbances are the most prominent symptoms manifested by persons unpleasantly affected by high altitudes, but these are not the only symptoms, and are probably never the primary ones. Theoretically and practically, the lungs are the first to feel the effects of high altitudes, but unless the altitude be very great, the lungs very susceptible to changes in the density of the air, or the person indiscreet enough to take too much exercise on first going to high altitudes, he may let pass entirely unnoticed the slight disturbances in his breathing. in his normal condition easily adapts himself to any climate or He is almost the only animal who can live and thrive in the torrid zone with a temperature of 110° to 120° F., or in a frigid zone with a temperature from 60° to 80° below zero. He lives, works, and thrives thousands of feet below the earth's surface, or on the highest mountains, miles above sea-level, but to perform these feats a process of acclimatization is necessary.

A study of the effects of extremely high altitudes on the unacclimated is exceedingly interesting. In 1887,I reported a case of temporary amnesia and confusion of consciousness in a person who ascended to the top of Pike's Peak (elevation over 14,000 feet) on horseback. (See *Journal of Nervous and Mental Disease*, October, 1887.) Last year (1890) I reported to this association an additional case in which the legs were temporarily paralyzed in a man whilst crossing in a wagon one of the highest passes in the neighborhood of Leadville (elevation of the pass about 11,000 feet). I can now add a third case in the person of a tourist (male), who

ascended Pike's Peak during the present year on the cog-wheel railroad. The case was related to me by Dr. Chapin, of Philadelphia, who made the ascent of the peak on the same train with the gentleman in question. When he reached the peak he felt perfectly comfortable, but on attempting to rise to his feet he found that he could not move his legs.

In the present paper I shall only make this brief reference to the effects of extremely high altitudes on the unacclimated. I desire to discuss the effects of the altitudes of the usual resorts for invalids who seek Colorado for purposes of health. My remarks will not be limited to the invalid class, for I shall have something to say of the effects of altitude upon unacclimated persons advanced in life.

An interesting paper might be written on the effects of a prolonged residence in Colorado upon men and women, but especially upon the latter. It is a subject which I have been carefully studying for seven years, but, as the results of my observations differ widely from the views of some of the oldest and best-known physicians in Colorado, I desire still further to pursue my observations and studies in this direction, lest I have arrived at conclusions which are at variance with facts.

In speaking of the influence of the climate of Colorado on the nervous and vascular systems of the unacclimated, I desire to be understood as referring to those who, on first visiting Colorado, take more or less active exercise, or live as actively as they had done at sea-level. By proper precautions the unacclimated in a vast majority of cases, be he an invalid or one in the enjoyment of sound health, can gradually accommodate himself to the effects of the climate, so as to experience little or no unpleasant effects in the process of acclimatization. Of this I desire to speak later.

On going into a rarefied atmosphere the work of the lungs is immediately increased. The usual "tidal air" sufficient for the demands of the tissues at sea-level becomes inadequate, and the additional volume of air must be obtained by increased frequency of the respiratory act or by a larger quantity of air being inhaled during each inspiration.

Theoretically it seems reasonable to expect that when the increased volume of air is obtained by increased frequency of respi-

ration, the pulse is more frequent than when the respirations are slower and more prolonged. I have made a number of experimental observations on healthy and invalid persons to determine this question, but as yet I have not found a spirometer suitable to my purpose. The observations which I made without an instrument to measure accurately the quantity of air inhaled at each inspiration, while they seem to point without much variation to increased frequency of the pulse under the condition above named, are yet not sufficiently accurate to be worthy of publication.

I have had several opportunities of comparing the effects of exercise on my own person in Colorado with the effects following a similar amount of exercise at sea-level. Invariably the disturbances have been greater in the former than in the latter place. This accords with the clinical experience of nearly every physician in Colorado, and needs no further comment here.

It is difficult, if not impossible, to separate the circulatory from the nervous phenomena. If we note the disturbances of the heart's action as a type of the vascular systems, we shall find that they are largely of a nervous origin, or, if we analyze many of the nervous symptoms, especially headache, vertigo, etc., we shall see that they are directly due to vascular disturbances, although the latter have their origin in irritable nerve-centres.

What part lessened atmospheric pressure plays in the production of many symptoms manifested by the unacclimated in Colorado, at altitudes varying from 5000 to 8000 feet, it is difficult to determine. That it exerts some influence is quite evident, but that the influence is almost inappreciable at an altitude of 5000 or 6000 feet in producing unpleasant symptoms seems equally evident when we remember that by proper precautions the unacclimated whose breathing capacity is fair without having the atmospheric pressure modified, becomes accustomed to the altitude, and suffers but little inconvenience in the process as long as he gives his heart and lungs as little to do as possible.

For all practical purposes, then, at altitudes varying from 5000 to 8000 feet, the inconvenience of the unacclimated seems to have its origin in the increased respiratory activity, and this in turn leads to increased work of the heart, which by its over-work causes at first an active hyperemia and an irritability of the nerve-

centres. Later the nerve-centres suffer from imperfect nutrition induced by a poor blood-supply which results from passive hyperemia. We have then the "irritable weakness" of the old pathologists. After the nerve-centres have become irritable, neither the respiratory act nor the heart's action is performed as regularly and methodically as in the normal condition; and, in consequence, various unpleasant symptoms are experienced by the unacclimated. Persons possessed of considerable vigor, and capable of adapting themselves to great changes in their environments, go to high altitudes and live almost as they had done at sea-level, and find no appreciable inconvenience in so doing; but for those advanced in years and for those of feeble health the consequences are far different.

Heart and Pulse.—I have observed the action of the heart and the condition of the pulse in a number who have experienced difficulty on going to Colorado. At first the heart's action is increased in frequency and force, and the pulse is increased in volume and tension; but soon the heart becomes irritable, its action is less effective, its beat is quite rapid, and, at times, irregular or intermittent. At this stage the pulse loses its increased tension and volume, and is usually small and weak. The superficial capillaries are commonly dilated, and if the heart be still further taxed, beginning cyanosis of the face and distal portions of the extremities renders apparent the inefficiency of the cardiac systole. Palpitation and oppression in breathing or various uncomfortable sensations over the precordium are quite common in those whose hearts have become irritable on going to Colorado. Some complain of a dyspnœic or smothering sensation, and say that they feel as though they were unable to breathe sufficiently to relieve their distressed condition.

An over-worked heart in a high altitude probably gives rise to the most distressing and alarming symptoms in those advanced in life, and especially to those whose hearts are fatty, or weak and flabby. In two such that I have seen, the first unpleasant symptom, beyond a little shortness of breath and a slight uncomfortable feeling over the heart, was fainting, followed by cyanosis and prolonged unconsciousness with stertorous breathing. In one the unconscious condition lasted fifteen or twenty minutes, and in the

other, several hours. Both were greatly prostrated after the attack, and did not regain their strength until removed to a low altitude. They were kept quiet, in a recumbent posture, and fed and stimulated for several weeks: but they seemed to lose strength, and finally had to be removed from Colorado in a recumbent posture, as a slight elevation of the head caused cardiac distress and a fainting feeling. Both rapidly recovered their strength on reaching a low altitude, where one well advanced in years is still living. The other is now residing in Colorado at an altitude of about 5000 feet, where, with proper precautions, the altitude seems to be borne quite well.

Gastric and intestinal disorders are not infrequent in persons who suffer in the process of acclimatization. These are evidently of a twofold origin, nervous and vascular.

In two persons, soon after their reaching Colorado, and on their taking an undue amount of exercise, I have known hemorrhoids to be suddenly developed. In one case the constitutional disturbance was very severe. The patient, a lady, became hysterical, had a chill lasting an hour or more, and this was followed by a rise of temperature, reaching 106° two hours after the chill. The temperature was 100° six hours later. A severe inflammatory attack of hemorrhoids followed. In this case there was no hepatic, gastric or intestinal trouble at the time to account for the development of the hemorrhoids.

Hyperemia of the exposed mucous membranes is the ordinary experience of most persons who go to Colorado. Lessened atmospheric pressure may aid slightly in producing this, but the chief cause is the dryness of the atmosphere, except in those portions of the State in which considerable alkali is mixed with the dust. In the latter condition the hyperemia is followed by chronic inflammation and thickening of the exposed mucous surfaces. Under such conditions, acclimatization does not protect, and these changes may be classed with the chronic effects of the climate, and need not be further considered here.

Menstruation.—There is a prevalent opinion in Colorado that the climate modifies the menstrual flow in various ways, not only in the unacclimated, but also in those who have resided there a number of years. To what extent, I hope to be able to form

some estimate, when I have gathered data for a paper on the chronic effects of the climate on the nervous and vascular systems. Many ladies seem to experience but little or no effect from the climate on their menstrual function on first going to Colorado, whilst in others the periods become irregular and the flow is increased. On this point I am not satisfied, as the number I have interrogated is too limited to enable me to draw conclusions, especially in regard to a function that is so frequently perverted by causes other than climatal.

In speaking of the nervous disturbances experienced in Colorado by the unacclimated who suffer from the effects of the climate, I shall try to refer to them as nearly in the order in which they arise as possible, although it must be remembered that this can be done only for the majority, as there are always exceptional persons who suffer differently from others. It is not an easy matter to know how much to attribute to climate. By some, every nervous symptom that is felt in Colorado is attributed to the evil effects of the climate, and these same persons lay down a dogmatic rule to the effect that every nervous affection is increased by going to Colorado. Of late, as the effects of the climate are being more carefully and scientifically studied, we are learning to attribute some influence, especially on the nervous and hysterically inclined, to mental impression. Many persons who go to Colorado are fully convinced before they have been there twenty-four hours that the climate will affect them unpleasantly, and that they will be unable, to live there. They believe every exaggerated statement repeated by the credulous, and soon begin to experience the sensations that they have been led to think will be caused by a dry climate in a high altitude. Further, we have learned to contrast nervous affections observed in the East with the same studied in Colorado, and some of us believe that we find but little if any difference in their course, except probably for the functional nervous disturbances which are, I think, slightly exaggerated by the climate of Colorado.

Almost every person on first going to Colorado experiences a sensation of well-being and stimulation. The mind is active, and there is a tendency to indulge in day-dreaming or castle-building, rather than in a philosophical meditation. Thought after thought,

in quick succession, rapidly flits through the mind, pleasant and entertaining for the time, but usually evanescent in character, and the aspirations and ambitious resolves, which are then formed, are short-lived, and rarely lead to permanent results.

The motorial system is not unaffected, and the desire to exercise is great. If physical exercise be indiscriminately indulged in the person soon becomes restless. To keep quiet then is difficult and irksome, but to continue the exercise increases the nervous, restless feelings. The legs feel tired and heavy, and numb and tingling sensations, with pains in the joints, are often experienced. Sleeplessness follows, and this, combined with restlessness, makes the night almost unendurable. I wish it to be understood in this connection that I am now speaking of the unacclimated who go to Colorado and live injudiciously. For the vast majority of persons, who seek Colorado for health or recreation and live as their changed environments demand, sleep is, as I have pointed out in another communication to this Association, easily obtained, sweet, prolonged, and refreshing. Headache is a common complaint of those who experience unpleasant symptoms in the climate, and more commonly follows than precedes sleeplessness. It is sometimes of a dull, heavy character, without definite location to any part of the head; at other times, it is frontal, but more commonly it is occipital, when it is often associated with a drawing sensation in the back of head and neck, and frequently with tenderness over the cervical spines. At this time the heart is irritable and tinnitus aurium is complained of. Following this train of nervous symptoms comes depression of spirits. The sufferer gets low-spirited and has "fits of the blues." exceedingly nervous females it is not uncommon to hear outbursts of hysterical manifestations. Some are troubled with fainting spells, dizziness, or even marked vertiginous sensations. Irritability and peevishness are common in those who have become excessively nervous on going to Colorado. Mental depression becomes so great in some as to lead to slight mental confusion. The mind may work all right for a while, but sustained mental effort is difficult and tiresome. I have not seen a case of insanity in which I have been able to attribute the cause solely to the effects of the climate. I have known a number of cases of insanity in which the violent outbreak has developed soon after going to Colorado, but in these the climate and scenery of the State had been sought simply for the sake of change and diversion, and the subject had been kept going from place to place, excited and over-worked, and in some cases sufficient sleep had not been obtained, nor the proper amount and quantity of food taken.

Time for Acclimatization.—It is impossible to say how long a time is required for a given person to become acclimated. Many persons of vigorous health and constitution, with good lungs and a normally acting strong heart, seem to adapt themselves to their new atmospheric conditions almost immediately after reaching Colorado, and never experience any perceptible difficulty, although they indulge in active exercise and various other indiscretions regardless of possible effects. Others, less favored by nature, experience slight inconveniences on first taking active exercise, but on further persisting they cease to be troubled, and live as comfortably as they had done at sea-level.

For all persons suffering from pulmonary disease, heart affections, organic or functional, or from irritable and excitable nervous systems, the process of acclimatization is of the first importance, and seems to be but little understood, or, if understood, not heeded by the majority of physicians living at low altitudes. For each individual belonging to any or all of the three classes above mentioned, specific rules must be laid down by his physician in Colorado, and these rules can be only safely varied from time to time, as the favorable progress of the case may indicate. Time, per se, seems to play an insignificant part in acclimatization in these cases. It is the effect of the climate on the invalid, and not the time spent in Colorado, that enables the prudent physician to judge as to what his patient may or may not do.

Some persons never become accustomed to the climate of Colorado, and although they may spend years there, are never able to live as they were wont to do at sea-level. For such, eternal watchfulness and care are the price of health and comfort there.

How Persons Should Live During the Progress of Acclimatization in Colorado.—It is on account of the great importance of this part of my subject that I have endeavored to write on the nervovascular disturbances arising in the unacclimated in Colorado. For persons advanced in years, and for nearly all invalids, there is but one rule—keep comparatively quiet at first, and, when moderate exercise is begun, always stop short of the point of decided fatigue. I have not treated chest troubles since I went to Colorado, but, being a consumptive myself. I have taken a keen interest in a number who have gone there for pulmonary disease, and have tried to watch and profit by the causes that have seemed to determine their success or failure in regaining their health. Of the suitable cases of pulmonary consumption that have sought Colorado, I do not think I am exaggerating when I say that untimely and over-exercise have killed more persons than the progress of the disease. Both clinically and experimentally it is quite positively determined that a comparatively quiet life is the one most conducive to the health and welfare of the consumptive on first going to Colorado. For the consumptive there are many reasons why exercise should be limited at first, and subsequently indulged in only as is thought safe by his physician.

For persons of irritable nervous temperament, and for those suffering from weak or irritable hearts, a quiet life is by far the best on first going to Colorado. Persons, the muscular tissue of whose hearts is beginning to degenerate, should not go to Colorado or any other place with an altitude many thousand feet above sea-level. In all cases, no matter what the ailment may be for which a high altitude is sought as a health resort, it is better and safer for the patient to follow the directions of the local physicians than to try to take regular and systematic exercise, such as horseback riding, etc., not infrequently prescribed by their medical adviser who lives thousands of miles distant. It has been my lot to meet in Colorado loyal patients whose lives have been sacrificed by over-exercise in their attempts to take as much exercise as they had been requested to do by their physicians before they left home. The advice, often given by physicians, unacquainted with the climate of Colorado, on sending

patients there, is: "Go to Colorado; live in the open air as much as possible; live on horseback all day long; herd sheep or drive (punch) cattle." The first part of this advice—"live in the open air as much as possible"—is excellent, but the remainder is simply murderous for nine out of every ten consumptive patients who go to Colorado.

In this paper I have endeavored to enumerate most of the nervous and vascular disturbances from which many invalids. who seek Colorado as a health-resort, and over-exercise on first going there, will suffer. I might add to the vascular disturbances, pulmonary hemorrhage, only, however, to be feared when exercise is considerable. On the other hand, for nine out of every ten invalids who go to Colorado and live as quietly as their cases demand, the process of acclimatization will be easy and unattended by any serious inconvenience. The other onetenth, either on account of excessive nervousness, irritable or weak heart, or some other unavoidable cause, will experience some difficulty on first going there, no matter how quietly they live, but the disturbance is incomparably less by living a quiet life. Of course, in this estimate, we must exclude certain cases of far-advanced consumption with little breathing room, which should never go to a high altitude. Despite every effort to the contrary, there are a few nervous and consumptive patients who can never live comfortably in a high altitude. I suspect that in these cases the heart is at fault. Some persons go to Colorado, and while living a comparatively quiet life, are so uncomfortable as to have to seek a lower altitude, but in a few months return and live there without much inconvenience.

I have known persons, for whom a lower altitude was out of the question, become so nervous and miserable in Colorado that their lives were a burden to themselves and friends, go to bed and live absolutely quiet for a few weeks, then become less nervous and be able to live there in comfort and take a moderate amount of exercise. In my opinion, the best management for all persons who become nervous, irritable, sleepless, etc., in Colorado on account of the climate, is a residence at a low altitude for a few months. We must remember that many persons become exceedingly nervous at sea-level, so that a great many cases of nervousness arise in Colorado with which the climate of itself has little or nothing to do. Some cases of nervousness arising at sea-level are benefited by going to Colorado, provided exercise be avoided at first.

Most cases of pure nervousness arising in Colorado are more or less benefited on seeking a lower altitude.

# EPIDEMIC OF INFLUENZA IN PHILADELPHIA IN 1889, '90, '91.

By ROLAND G. CURTIN, M.D., AND EDWARD W. WATSON, M.D.,
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This paper is largely based upon 5000 to 6000 cases of influenza seen in private practice, besides many seen in hospital service, and many severe and unusual cases in consultation. No attempt has been made to arrive at results from mere statistics, but rather from the results of personal observation and generalization.

EPIDEMIC OF INFLUENZA IN PHILADELPHIA.—We use the name of Influenza because "La Grippe" was applied to epidemics in which there was a sudden seizure with an almost constant sense of constriction about the throat and chest; and because "La Grippe" is but a newspaper term.

The question of the method by which the disease was transmitted deserves the first consideration. In almost innumerable instances families were exempt until one member contracted the disorder, after which the whole family rapidly succumbed. In the second year the families exempt during the first were almost universally attacked. The same was true of large groups of individuals engaged in the same locality and occupation. Those brought in contact with affected families, like physicians in active practice, rarely escaped. Isolated communities, schools, reformatories, prisons, etc., often escaped entirely, or, if not, suffered generally. The Blind Asylum escaped the first year, and suffered severely and generally the second. A contiguous female reformatory was universally affected early in the fall of 1889, and very little, if any, except in newly admitted cases, in the second year.

The nurses in the Philadelphia Hospital were simultaneously attacked to the extent of 30 per cent.

The contagion seems to have spread around the world rapidly by some unknown peculiarity; but in cases under local observation it did not seem to be far-reaching, but rather depended on personal contact or proximity, and very slight obstacles prevented its spread—as the wall of a house or the enclosure of a limited space of ground. A family in a block surrounded by cases (in more than one instance), escaped entirely during the first winter, but in the second, a member having contracted it, the whole family succumbed to the influenza. Crowding of the sick, especially in small apartments, seemed to intensify the contagion, and increase the risks of those entering. In close rooms, crowded and poorly ventilated, the disease was more intense and spread more extensively and rapidly, and relapsed more frequently. This was noticeably so in the instances of the Pennsylvania Legislature in the Spring of 1891, where sixty members were confined to bed, necessitating adjournment and fumigation of the building; and the Houses of Parliament in London, in 1890 and 1891, were closed for the same reason and fumigated. The immense number of cases made the difficulty of proving direct contagion in any one case much greater, but the proof of the contagion generally seemed as positive as in any other recognized contagious disease.

Next to the question of contagion is the symptomatology of the disorder. The most important symptoms were undoubtedly those connected with the nervous system, and it is a serious question whether all the symptoms were not due primarily to derangement of that system. Some might consider it more probably a blood disease, in reference to which see our remarks further on.

RESPIRATORY TRACT OR SYSTEM.—The initial nasal catarrh so associated with the name of influenza as to be popularly synonymous with it, often failed to appear early and was manifested later amid other affections of other organs. Inspection of the fauces, however, showed them often reddened on the anterior and posterior half arches, with a dark color like the "port wine stain," but without swelling and very much resembling rheumatic sore throat, and there existed in all these cases a sensation of

tough mucus in the pharynx, requiring frequent and excessive efforts in swallowing and clearing the throat. Violent coryza was seen in about five per cent. of cases as an initial symptom, and appeared in about fifty per cent. in some degree; often it would yield on the invasion of other organs only to reappear before each relapse.

The most noticeable feature was a form of bronchitis, of the exact nature of whose pathological condition we are somewhat in doubt, post-mortem investigation very rarely, if ever, offering itself at this stage, so that exclusion and reasoning from the facts in our possession seemed to afford the only means of reaching a reliable conclusion. From ordinary bronchitis it differed on superficial observation in its duration, in the character of its expectoration and the pain which attended it, in its râles, in the persistent pharyngeal catarrh which accompanied it, the condition of the tongue (yellow moist fur), its localization in one or other lung or portion of lung, and its rapid shifting from point to point, from one lung to the other, from apex to base. All these peculiarities being generally associated, each case formed a group of anomalous symptoms easy to recognize and difficult to confound with anything else. To these may be added the existence generally in 1889 and 1890 of sharp pain like a pneumonic stitch, and often a plastic pleurisy rapidly disappearing.

To examine these symptoms seriatim: The duration varied from one week to three months or more, during which its severity rose and fell, and its locality changed until apparently in some cases the whole pulmonary tissue had been submitted to the diseased process piecemeal. The expectoration may be described as gelatinous, like a semi-opaque wine or gelatine jelly of soft consistence, not as tough or rusty as the gluey sputum of pneumonia—almost brittle or crystalloid; free, never ropy, and generally of a light yellow tinge; scarcely at all purulent except during convalescence. In the spring of both '90 and '91, it was often like clear boiled or scalded starch or tapioca. To expectorate this great efforts were required, though the spells of coughing might be infrequent. Exceptionally the sputum was frothy. The sputum early in the epidemic was frequently noticed to be quite black from minute particles resembling soot or coal-dust. The cough was irritative

or explosive, like that resulting from inhalation of pepper-dust or smoke, or like the spasm of whooping-cough. At the Philadelphia Hospital the children attacked were even isolated under the impression that the latter was the disease from which they suffered.

The collection and 'retention of this exudate in the tubes gave rise to râles peculiar in themselves, most noticeable as to their vocal character, and their low pitch, as compared with spasmodic or asthmatic râles. This showed, in the opinion of the writers, dilatation rather than constriction in the lumen of the tubes in which they were formed. There were also more minute râles stimulating the subcrepitant râle, rather coarser, but giving the impression of less moisture in their production. These occupied limited areas, as the lobe of one lung, and were very migratory—more numerous than the fine crackling of phthisis, and resembling closely the full-fledged stage of softening croupous pneumonia with its subcrepitant râles.

Perhaps the most peculiar condition was that in which the air appeared to go in and out of the tubes readily, but without any rhythmical and normal expansion of the chest, or the auscultatory signs of respiration, the vesicular element being entirely lost; the patients sometimes dying apparently of apnœa. In one case, the day before death, breathing was at the rate of 66 per minute; pulse, 74; temperature, 99° F., the lungs showing no physical signs of any impediment to the entrance of air, the breath being drawn in and out without apparently performing any function or serving any use, and creating the impression that the bronchioles and air-vesicles were in a continually dilated state. This was a peculiarity of a considerable number of cases in 1889 and 1890. Some cases even showed an effort at forced voluntary expiration.

Dry crumpling was another physical sign which seemed almost peculiar to this disease. It was not like that sometimes heard in chronic emphysema—not so coarse, and more migratory—limited generally to areas, suggesting that the condition of the small bronchi supplying them was a factor in its production.

The symptoms and physical signs, and temperature, often subnormal, did not always suggest an inflammatory condition of the lung. The mechanism in some marked cases could be easily accounted for by a condition of the air-tubes and vesicles which might be nervous in origin. The low pitch of the sonorous râles—low in tone as the human voice—as contrasted with the well-known higher pitched râles of bronchial spasm in asthma, suggested the idea that the tubes were enlarged rather than contracted in caliber. The same could be said of the peculiar breathing alluded to before, in which there seemed to be no contractile power in the periphery of the lung. The occurrence of phthisis without bacilli as a sequel might lead one to suppose that the conditions were favorable for an inflammatory process, even if it were not already present; on the other hand, the retained secretions in steadily dilated vessels might become after a time a source of irritation, and also the centre of a degenerative area. It was noticed that the chronic asthmatics did not suffer to any great extent when attacked, and many have been relieved of what was before a constant condition, and have remained better up to the present time. In some cases with these peculiar symptoms there appeared for a short time a faintly and uniformly pink-tinged mucous expectoration, although it suggested a passive rather than the hemorrhagic condition of croupous pneumonia. Croupous pneumonia itself was exceedingly rare. One of the writers failed to observe a single case in the winter of 1889 and 1890; the other met with but two. Symptoms of catarrhal pneumonia existed in walking and working cases. True catarrhal pneumonia in children was even rarer than usual. Considering the violence of the cough, it suggests itself to us that the absence of hemoptysis in connection with it might be explained by the cardiac weakness and the consequent reduction of blood-pressure. The similarity of the symptoms to whoopingcough, where hemorrhages from the air-passages are more frequent, somewhat sustains the idea.

Profuse catarrhal discharge from the nose often made patients at night imagine that they had epistaxis. The flow was intermittent and associated with pain over the frontal sinuses.

Latent cases also resembled phthisis, in shortness of breath, nocturnal sweating and cough, expectoration which was not purulent, gastric catarrh and dyspepsia, while the diagnostic differ-

ences were physical exploration, no pus in expectoration or bacilli, and an absence of emaciation.

NERVOUS SYSTEM. Cerebral Symptoms.—Insomnia existed at some period in almost all cases, and was peculiar and diagnostic. It was like the insomnia of insanity, but existed also in the morning hours. Its duration varied; in one case it lasted three months, reappearing for two days between each menstrual period in another it lasted two and a half months, the patient only sleeping when erect in a chair, and while the usual din of daily life prevailed around him. Dread of sleeping was sometimes combined with insomnia; sometimes sleeplessness was the only symptom of the disorder.

Delirium was rare in the fever, but when it existed it was reasonable, the images being vivid but not annoying, and the patient could be easily roused to take a sane view of things and perceive the absurdity of the situation. In some cases, however, the delirium merged gradually into insanity.

Insanity.—A city magistrate remarked upon the frequency of applications for certificates in the last year, 1891. Insane ideas were acknowledged by many; especially a desire to commit suicide; but these were generally controlled by good judgment, and discussed calmly by the patient as aberrations. Fear of going crazy was excessively frequent. The writers collected in all 38 marked cases of temporary and permanent insanity.

Meningitis.—Meningeal symptoms existed both with and without pain. Many cases at first seemed threatened with cerebrospinal fever, these being most common in the second year. Convulsions were rare, but unconscious attacks at the onset were occasionally met with. In the first year meningitis, when it occurred, was of short duration, and considering the disturbance of the nervous system was not severe, but was sometimes fatal. Hemiplegia occurred in one case preceded by a chill; one case of paralysis of both arms (age 80), lasting 4 months, and followed by recovery; and one of both legs (age 48), lasting six months and also followed by recovery, were met with. Vertigo, frontal or occipital, or passing from one region to the other, was common, Violent headache was generally occipital, at times occipito-frontal, and often continued for months. Cases

which were left with local or general paralysis were subject as a premonitory symptom to exceptionally violent headache. Among the headaches the so-called uterine headache was probably due to the succussion of violent cough. All these headaches often disappeared soon after rising, or exhibited steady improvement towards evening. The same improvement as day progressed was noticed in the vertigo and unsteady gait with which some cases began their attacks (in the first year), and in relapses these symptoms were often forerunners of a renewed attack.

Sight was often temporarily lost. There were sometimes weak vision, loss of accommodation, frequently photophobia with congested conjunctiva, and localized pain over one or both eyes; and museæ volitantes.

Buzzing, rushing and roaring noises in the ears or fine singing or chirping like crickets (not cinchonism) often persisted for weeks or long periods. Sometimes for a short time or permanently that modification of this sense was lost which enables us to locate sounds; noises upstairs seemed from below, or vice versa.

We noted numbness of the limbs (one or both), sometimes general hyperæsthesia; as also constriction round the waist meeting at the epigastrium (this generally came on late in the disease). Sometimes pain and constriction ran from hip to hip across the back and sacrum. A sudden loss of power in the limbs was sometimes an initial symptom. As a rule, sensory nerves were affected more frequently than motor. Neuritis was not frequent during the first year (unless in the intercostals), but was more common in the second.

True neuralgia was rare. General muscular soreness did occur, but the nerves could often be stretched and pressed without increasing pain. Pain in the joints was rare and evanescent. Sometimes joint-pain was stinging without redness or swelling. The scalp was frequently sore to the touch for a long time. Pain "in the bones" was a frequent designation, often in the skin and superficial muscles at the onset. It was also quite general across the sacrum and down the legs, producing uneasiness, so that the patient was continually moving his limbs. Shifting pains were common during the first winter; often one and then the other of a pair of nerves were affected; and the writers have seen the pain

leave one side and attack the other, and then go back and settle in the first side attacked, especially in the intercostals. The general pains abated during the sweating stage, and returned when the sweating in the head and limbs decreased.

The generative powers were, as a rule, much weakened. In many cases power was lost for long periods—ten months or a year, and sometimes, it seems, permanently.

The senses of smell and taste were generally perverted, rarely lost. A facial taste and smell were either associated with everything or with some particular articles of food. Some of these derangements were so severe as to hint at mental disorder. All noticed by the writers, however, finally recovered.

Spasmodic affections to which the patient was previously subject were not aggravated, but often arrested or apparently cured, as chronic asthma, hay fever, etc.

Cramps in the calves, pain and trembling in the legs on standing or walking; creeps or chilliness, general or limited to one place; travelling chilliness or tickling sensations were constantly met with. A sound or a touch or the brushing of another's clothes past the patient would often excite a creep; moving the legs in bed would do it. There was no chattering of the teeth. The thrill of coldness was superficial, no evidence existing of coincident internal congestion of any moment, but the creeps were almost always followed, eventually, by some relapse or exacerbation. Alternate creeps and fevers and sweating occurred, and trembling and chills alternated. Pricking in the hands and feet, "cutis anserina," and formication, which at times seemed to indicate a renewal of the attack, were also noted.

Localized pains in the first year were most common in the intercostals; the side affected with pain was usually the side showing the peculiar bronchial physical signs. This pain simulated pleuritic or pneumonic stitches, but if pleurisy existed it was only with limited plastic effusion. Pain in the brachial nerve was very frequent. It often slowly descended from the shoulder and followed the course of either radial or ulnar—generally on the right side—and exhibited painful spots or pain on pressure over its course. Pain in the hypochondrium—generally the right, and from the right shoulder to the ilium—was frequent. Creeping

pain in the epigastrium and region of the pancreas, apparently accompanying peristaltic movements and excited by swallowing, was noticed. The pain was generally that of irritation rather than inflammatory. In the sciatic nerve there were all grades of disturbance from numbness to well-marked sciatica, and these pains also travelled slowly down to the leg, foot, ankle, and heel, and in the latter locality occasionally persisted about the tendo Achillis and ball of the heel for some time.

The prostration and exhaustion deserve special mention. Sometimes there was at the onset sudden prostration, the patient, but the moment before a well man, becoming at once incapacitated for any movement. Often the mental prostration was less, but continued longer, in convalescence. For months after apparent recovery fatigue or exposure would bring on exhaustion or "goodfor-nothingness;" in fact, the relapses seemed due more to nervous conditions than to the condition of the blood. Mental effort or emotion was sufficient to cause this condition to appear and reappear. Sustained thought was often utterly impossible. Sometimes it was extreme general fatigue, although no work had been done. In the second year all these symptoms were more marked and protracted.

The peculiarity of this exhaustion and weakness was evidently in the patient's absolute unconsciousness of it till he made trial of himself. At rest he felt capable of exertion, and often as well and strong as ever. The attempt to rise from bed failed at its edge, where he would sit quite done out; or, if a walking case, he would decide to go a few squares only to find, after walking a short distance, that he was obliged to rest on some door-step, utterly unable to go any further. To a certain extent the same was true of the heart and lungs; heart-beat and respiration might be nearly normal at rest, but in effort there was a sudden slowing down of the heart, with embarrassed respiration, and further effort was sometimes fatal.

To us these symptoms seem to point to a more or less complete interruption of those channels through which the economy is enabled to summon up all its nerve-force to any particular place required. There is no proof that the general amount of nerve-force was less, but it was distributed, and for practical purposes

could only be massed slowly when and where required. A short rest gathered and stored up enough for a little more effort, and so on; or, to use another illustration, the reservoir of nerve-force filled too slowly, and there was only enough in it to keep the organs going on the lowest possible scale—sudden and general demand exhausting it.

ALIMENTARY SYSTEM.—The tongue was moist always, and this was true in all diseases and conditions of a low type during the prevalence of the epidemic up to the present time. Thirst and hunger were both remarkably rare. Thirst was absent even when the temperature was exceedingly high, due perhaps to the moist condition of the tongue and throat. The taste, as well as sense of smell, was sometimes perverted. (See Nervous Symptoms.) The tongue, on examination, was sometimes white and flabby, large and indented; sometimes with creamy fur, and in a few cases a bilious-yellow; when white it was generally studded with red papillæ and had a tendency to flake off, leaving a moist, raw, smooth, very red surface, and this indicated very slow convalescence. In the pharynx extreme pain on swallowing, without redness or swelling, was a not uncommon symptom.

Nausea was met with in quite a number of cases, but as a rule the stomach retained what it received.

The appetite was exceedingly variable. In the abdominal form there was absolutely none, but there was an utter unwillingness to eat. In other forms the appetite was often excellent, and food was taken and assimilated. Pain in the region of the stomach seemed to be really situated in the surrounding organs rather than in the stomach itself.

In the intestines the most pronounced condition seemed relaxation and want of tone. Passive distension was common, but no tension of the abdominal walls was present. Gurgling was present in limited, but shifting areas; when in the right iliac fossa it gave rise to a suspicion of enteric fever; when associated with diarrhea it increased the suspicion—but it could be found at times to cover the whole abdominal area. Peristaltic action seemed weakened or lost. This loss of power extended to the rectum, as shown sometimes by constipation with inability to expel the contents of the bowels except after frequent efforts and in small masses. One

long case of diarrhea was noticed, but most of the attacks were short; often slight provocation induced it, and generally it was worse at night, probably from indigestion, the food taken during the day proving irritant. Constipation was the rule when diarrhea was not present.

Heart Symptoms.—Pericardial distress, exhaustion, slow pulse even in fever, were noted. Marked cardiac failure in some cases occurred weeks after the attacks, with no other symptom, lasted a few days, and was followed by recovery.

Inflammation of the heart was rare. No endocarditis was met with except when associated with a complicating articular rheumatism; three cases of pericarditis were seen. The heart was often irregular, slow, and feeble with soft slow pulse, and when evidences of heart-failure occurred, there was rarely even much bluish tinge of the surface. Heart-failure caused most of the deaths in the earlier part of the first year's epidemic.

The symptoms indicated want of nerve-power rather than impaired heart muscles, since recovery was often so rapid. Not many accelerated hearts were noticed. Cases affected with organic disease of the heart seldom had heart-failure, in fact cases did not succumb at their weak point. In so-called pneumonia, heart failure was more common than the condition of the air-cells seemed to warrant.

Blood and Circulatory System.—Hemorrhages were not infrequent and occurred early as a rule. Epistaxis was rare except when associated with aggravated nasal catarrh, being then slight in amount and generally mere streaks of blood mingled with mucus. Pulmonary hemorrhage was limited almost entirely to the early stages of bronchial cases and to a few cases of pneumonia. Pinktinged mucus rather than large amounts of blood was the rule. Hæmatemesis was exceedingly rare; three cases were noticed, all in women, suggesting sexual causes. From the bowels also hemorrhage was uncommon except when associated with an apparent typhoid fever; in these, assuming them to be typhoid, it was more frequent than usual, and occurred too early to be due to sloughing of the glands. This early hemorrhage, also, when associated with mucous stools and constitutional symptoms, was confounded early in the disease with entero-colitis.

From the urinary tract hemorrhage was noticed in a considerable number of cases; in all the blood was changed, sometimes smoky and often in flocculi, black and altered. This condition was accompanied by pain in the region of one or both kidneys, in a small number of cases. In cases of purpura the hemorrhage seemed to us to be accounted for by a vaso-motor paralysis or leakage. Acute simple anaemia was frequently observed late, often gradually increasing, but not accompanied by dropsy or other extreme symptoms. This anaemia could not be accounted for by imperfect nourishment, since in marked cases the digestion was not impaired to any great extent.

The late spring and early summer of 1890 witnessed an outbreak of dysentery, mild in type and easily controlled.

The influenzal poison, whatever its nature, exhibits in protracted cases a likeness to malarial poisoning in symptoms and length of duration, in temperature range, and in long and short relapses. The disappearance of malaria in its presence would argue that the poison was, like the paludal, of a blood type, following the same course and affecting the same structures; a blood parasite in fact deteriorating that fluid, and especially manifesting its toxic force upon the nervous system. This is a possible hypothesis.

A similar resemblance following somewhat different lines allies this disease (influenza) with relapsing fever—undoubtedly a disease produced by a micro-organism in the blood. The tendency to relapse, the profuse sweats which terminated the paroxysms, and the sub-normal temperature following the exacerbations, seemed to support this view.

In its tendency to produce sudden and dangerous heart failure we again see a resemblance to two other blood diseases—diphtheria and relapsing fever; but the paralyses, cardiac included, of diphtheria are much more prolonged and more likely to depend upon an actual change in nerve structure.

AFFECTIONS OF OTHER ORGANS. NOT ALREADY ENUMERATED.—Hepatic jaundice was rare; hepatic tenderness was common, but not marked; the stools were rarely bilious; the vomited matter was rarely bilious, even when retching was severe and prolonged. Three cases of marked catarrhal jaundice only

were noted. The liver was not found perceptibly enlarged in many cases. The milder cases were of two kinds, either with arrested or retained secretions.\* Bitter taste in the mouth was often complained of, and this as often rapidly disappeared.

Renal.—In the urine a slight ring with nitric acid resembling albumin was common, but without clouding when heated. Early in the epidemic there was often a dark mahogany-colored or smoky urine. When the kidneys were painful, it was at first sometimes scanty and dark with blood; or frequently passed, copious and limpid, but becoming darker. Either frequent micturition or retention was noticed. The cases of limpid urine often became dark and smoky in a few days. Flocculent brown blood was often noticed in these cases, and in almost all the urine was not perfectly clear at some stage; a fine, sparkling dust appeared disseminated through it. A number of cases gradually developed chronic parenchymatous nephritis. A number of instances of urethritis with a clear transparent discharge, or sometimes one of milky whiteness, were seen.

Explosive cough produced, especially in women, involuntary urination. Dribbling of urine in children and old persons was without apparent special cause. Uric acid deposits were occasionally noticed at the crisis.

The pancreas seemed to be affected, though obscurely; and where gastric pains were prolonged and anorexia most marked, tenderness could be elicited in the region of that organ, and at times a doughy feeling was noticed. The pain was in thrills in these cases and at frequent intervals.

Abortion was very rare, as was also puerperal fever. Pregnant women escaped or had light attacks.

In the first year, 1889 and 1890, typhoid fever was rare, and catarrhal fever was confounded with it. Typhlitis, during the winter and spring of 1891, was notably more common than usual.

Skin Affections.—Erythema at the onset was of frequent occurrence, as is usual in ordinary influenzas, lasting from 12 to 24 hours. The occurrence of sudamina was frequent and associated with the more protracted and sweating cases. Prickly heat, lichen tropicus (closely allied to sudamina), was very common, and

occurred earlier than the latter. Acute dermatitis and varieties of this, simulating the symptoms of rubeola, scarlatina, and roseola, occurred in many cases. Purpura was rare. Of purpura rheumatica two cases were seen, and of erythema nodosum fifteen or more in one institution, associated with rather severer pain than usual. Herpes zoster was observed in six of our cases; herpes labialis was rare, differing in this respect from malarial fever. Two other physicians report eleven cases of herpes zoster. Dermatitis herpetiformis was so frequent that five cases came to the knowledge of the writers in one day. General and local pruritus were common. Prickly heat was frequently followed by boils. Erysipelas was exceedingly rare; roughness of the legs and forearms often passed into a distinct eczematous eruption. Prurigo in the second and third years seemed more frequent than usual.

Sweating accompanied the whole disease, alternating with chilliness, the sweating accompanying the fever and persisting for a long time, especially in the limbs at night, its disappearance being a good sign of recovery. Two cases of alopecia areata, following attacks of influenza, were seen by one of the writers.

Extensive loss of hair was infrequent, but slight and gradual loss in many instances continued for a year or more. Scarlatina, rubeola, erythema, cerebral and cerebro-spinal meningitis, erysipelas, and typhoid and typhus fevers were all confounded with influenza, and *vice versa*. There was no tendency to bed-sores even in long-continued cases.

TEMPERATURE.—During the first year the temperature was high, 101° to 105°; in the second year not so high. Subnormal temperature followed light attacks after twelve to twenty-four hours of elevation, and resumed the normal a few hours afterwards. Patients often went to their usual avocations with high temperature while unconscious of any fever; but one of the writers took in his office the temperature of five such cases in one day, and found in two cases 103°, in one 101.5°, and another 100.3°, and in a fifth case 104.4°. This condition in which the patient was not aware of his own fever was probably due to the marked moisture of the skin, and the absence of thirst, the latter being probably due to the moisture of the throat and its free catarrhal secretion.

In a few of the cases the temperature was subnormal throughout the attack. One physician had a temperature of 97° to 98° for two months continuously until complete recovery of strength. It was quite impossible to judge of the temperature by the hand.

In some cases the temperature remained elevated and the patients suffered a continuous fever, lasting sometimes for weeks; and these were generally diagnosticated as "typhoid fever;" but in many of these cases, when carefully observed by the writers, they presented all the characteristics of catarrhal fever alluded to before, and were wanting in the characteristic symptoms and sequelæ of true typhoid.

The face was rarely flushed for any length of time, and, if so at all, it was not limited to the upper part of the cheek. The physiognomy did not indicate suffering or distress, nor show, while quiet, any appearance of prostration.

Relapses.—The relapses seemed to occur most generally in persons in active middle life, those who were most exposed to cold, dampness, anxiety, and fatigue. Children and the aged, more carefully watched and protected, were less liable to relapse. Causes producing chilliness or over-exertion would singly bring on a recurrence of the attack. Internal organs as a rule did not suffer a second time, but the disease would either extend further in the same structure or attack an entirely different organ. Small chills, creeps, or formication, generally indicated an extension in an organ already suffering; more defined chills an attack in another organ. In the short explosive attacks of 1889 and 1890, those cases which were at once confined to bed and kept there until sweating ceased—five to seven days—did not suffer relapse, and had no subsequent trouble; whereas those who undertook to withstand it and worked through the first few days almost always succumbed and suffered severely. The number of relapses varied from one to as high as seven distinct and well-marked ones, gradually growing lighter unless produced by some gross indiscretion; some occurred at long intervals, even seven weeks. In relapses all the general symptoms recurred as above described.

These remarks concerning relapses do not include subsequent attacks, since in succeeding years or epidemics close on each other,

the liability to attacks remains; in fact those once susceptible seem always susceptible.

The most severe and protracted cases were generally in the educated classes, where occupation involves responsibility and the interests of others; while the laborer, as usual, readily gave up his work, though most dependent on it, having less at heart the interest of his employer than the clerk, bookkeeper, and overworked public servant. Those who gave up early recovered most completely, and so were less subject to relapses. Drunkards strangely escaped severe attacks.

The influenza type seemed to be stamped upon all diseases, modified them, and caused confusion in diagnosis.

EPIDEMIC IN 1890 AND 1891.—Grip-cold in 1891 consisted principally in headaches, frontal and occipital, followed by sore throat lasting from three to five days, and this followed by muscular pains in all the limbs. There were very few deaths during the second year in comparison with the first; but the deaths were mostly from protracted attacks, and a complicating meningitis. All through the period there was still a disposition to heart failure, but principally where it took the form of continued fever and pneumonia. In the first year very little croupous pneumonia occurred; in the second it was more frequent.

In the second year languor and exhaustion, or a "good-fornothing" feeling, with loss of appetite, was associated with a dry, hacking cough, much less marked than the year before.

Of typhlitis and rheumatism there were seen eight cases each in the second year, and eight cases of pleurisy with effusion.

It was noticed in 1891 that rheumatism was not associated with the usual sour odor, but a decomposed filthy odor like that noticed in influenza itself took its place.

Antagonisms.—Influenza cannot be a filth disease, as its initial outbreak was among the wealthy rather than the poor. The whole group of diseases characterized by squalid surroundings fled before its onset, and hid themselves somewhere. Good plumbing gave no immunity, sewer-gas offered no invitation. Abominably drained houses escaped the first year, were overhauled and put in good order in the summer only to be filled with obstinate cases during the second year. Many instances of houses with very insanitary surroundings whose inmates have

entirely escaped both years are known to the writers. Overcrowding, wherever the contagion had taken hold, obviously intensified the disease and assisted its spread. Diphtheria and diphtheritic tonsillitis, quinsy, follicular tonsillitis, which were universally prevalent in the fall of 1889 and 1890, vanished mysteriously and suddenly with the influenzal outbreak. Scarlet fever, for years allied to diphtheria, almost forming a hybrid with it, suddenly, though diminished in frequency, rehabilitated itself as simple, uncomplicated, and with throats free from patches; but all the patchy throats returned with renewed force in early summer. Measles was rare, whooping-cough rarer. Malaria, by which we mean that condition characterized by remittent and intermittent fevers, as well as the various neuralgias, amenable to quinine, disappeared. Arsenic and cinchona seemed to have no field, though the public took large quantities of the latter on its own responsibility.

Dyspeptics escaped or had digestive trouble only.

Asthma was relieved, postponed, or apparently cured. Hayfever was arrested at once by the influenzal attack, and in several cases has not appeared this year at the usual time.

People did not succumb in their notably weak spots. The cases of valvular disease did not have heart-failure; nor did those with irregular or the slow hearts. Nasal catarrhal cases had no specially bad catarrh when attacked. The permanently insane were not aggravated; the periodically insane did not specially relapse into insanity when attacked in the first year.

Gout seemed to flourish. No gouty person in the experience of the writers failed to have an attack of gout during or after one of influenza. Pseudo-membranous enteritis was brought on in new cases and in those who had already suffered.

Collated Paralyses (Involuntary).—In what light are we to regard the persistent occurrence of innumerable paralyses of involuntary muscles? The list is too full to be accidental—bronchial, vesicular, ocular, intercostal, cardiac, gastric, biliary, hepatic, vascular, vesical (probably renal too), intestinal, and rectal. These occur at once to the mind, and do they not indicate some disorder, some disarrangement, some alteration or possession of the nervecentres and nerve-trunks concerned in the vital processes of the economy?

To specially, but hastily, examine these: The bronchial, with its relaxed and unchanging calibre of the bronchi, bronchioles and air-vesicles, the difficulty of expectoration, the râles without excessive secretion, the necessity for supplemental spasmodic cough to clear the lungs, the abnormal chest resonance, have all but one signification, and were often preceded by intense thoracic pain.

The weakened accommodation showed a similar condition in the eyes. The intercostals at times were totally unresponsive, and breathing wholly diaphragmatic. The cardiac symptoms showed as in an illustrated diagram the effect of the action of some influence upon the various supplies of nervous force. The stomach rejected everything or retained everything without permitting it to pass down, or the bowels showed in particular regions stasis of peristalsis or passive distension, with ineffectual pain, denoting the effort of some remaining fibres to propel their contents, only to fail and allow it to recede.

The rectum and colon were the seat of persistent expulsion or retention; attacks of tenesmus often occurred without a trace of mucus or of blood, or there was torpor, so that no agent seemed to reach their impaired irritability. The liver suffered in two ways-impaired secretion and impaired excretion-and one variety might be succeeded by the other; tenderness, however, always preceded the latter. Vesical trouble was generally in the form of retention—the urine would be normal or even excessive in quantity, but the power of expelling it suddenly lost for one or two weeks. This occurred so frequently that it became diagnostic in some obscure cases. It was seen in all ages, as early as 10 months. as late as 86 years of age; and in cases that succumbed as well as in cases that recovered. It followed either the pulmonary or the renal attack. Lastly, when we consider the insomnia, the hæmaturia, and the hepatic tenderness followed by icterus, we may readily suspect a vaso-motor paralysis whose extent we have not begun to trace, and whose influence has a strong bearing on this whole question of the modus operandi of the influenzal poison and its manifestation. The paralyses and atonic conditions of motor nerve fibres which followed attacks can be studied with great profit. The sensory nerves were much more actively excited than the motor, as shown by the pains.

### THE SURGICAL TREATMENT OF ACUTE AND CHRONIC EMPYEMA.

By MAURICE H. RICHARDSON, M.D.,

THE remarks which I have to make upon the subject of empyema and its surgical treatment are based upon an experience now quite extensive in the surgery of the thorax. So much good work has been done and so much written upon this branch of surgery that it was with great hesitation that I accepted your President's invitation to present a paper in which it seems to me quite impossible to say anything which has not been said many times before.

The brilliant results which attended the first antiseptic operations for acute empyema made this field of surgery, fifteen years ago, one of the most attractive and interesting. While acknowledging fully the importance of cleanliness and antiseptics in the treatment of acute empyemas, I maintain, nevertheless, that quite as important an advance was made in the modification and in the completeness of drainage; in other words, that the improved ideas of drainage played quite as important a part as the introduction of antiseptics. The first thing noticed in the new treatment was a marked diminution in the time required for the expansion of the lung and the obliteration of the pleural cavity. That this was due entirely to the use of antiseptics cannot be maintained, because, no matter how careful the technique and the efforts at cleanliness, it is evident that the lung cannot expand unless the drainage be good. The introduction of one or more large drainage tubes, the free evacuation of the contents of the cavity—perhaps aided somewhat by the manner of the application of the dressing—all together have enabled the compressed lung quickly to expand and close the pleural cavity.

Believing that all cases of empyema are surgical, and should be treated surgically, I shall not spend any time upon the methods of treatment by aspiration. I consider them unjustifiable and unsurgical, and believe that valuable time is lost by their application. At the same time, I should acknowledge that occasionally this method is successful.

The pleural cavity should be drained as soon as the diagnosis of empyema has been made. Dangers in delay consist not so much in menace to the life of the patient from constitutional disturbances, as in the liability of the lung to form adhesions or to become diseased while contracted so as to make expansion difficult if not impossible. It is for this reason that immediate drainage is imperative in all cases of purulent pleurisy.

In the preparation of patients for permanent drainage, great care must be taken in rendering the field of operation aseptic. The method which I use is as follows: At least twenty-four hours before operation the skin is scrubbed with soap and water, and a layer of cotton-batting wrung out in hot solution of soap is applied. This is kept on twelve hours. The poultice is then removed and the skin washed in ether. Another poultice of corrosive sublimate, 1–3000, is applied and kept on until the time of operation.

General ansesthesia should not be used unless absolutely necessary. This is not only on account of its inherent danger, but also because it is very desirable to have the patient cough while the cavity is being emptied. While conscious, he is able also to express impending danger, as shown by subjective symptoms. This is so true of aspiration that no one would think of giving an anæsthetic for the purpose of thoracentesis. Another advantage in having the patient conscious is that he can make voluntary efforts at coughing. This serves to expel the pus and also to expand the lung. Lung expansion from coughing or crying I have been able to observe in several cases where a large incision had been made and a portion of the rib removed. By reflected light it was quite possible to see the lung expanding during the evacuation of the cavity so rapidly as nearly to close the pleural sac before the application of the final dressing.

In the usual form of empyema where the whole pleural cavity

is involved, the place of incision should be selected with reference to the case becoming chronic. If total obliteration of the sac takes place in the course of a few days, it makes little difference whether the drainage tube be put low down in the pleural cavity or not; whether in the eighth, ninth, or as high up as the fifth or sixth space. If, however, the case prove to be a chronic one, the lungs do not expand, and the cavity becomes closed by the usual method of collapsing walls, then the drainage tube should have been placed higher up, otherwise the lifting of the diaphragm makes drainage difficult and a higher incision necessary. It is better, therefore, to consider all cases as possible chronic ones and make the incision in the sixth or seventh space. It is better to make the opening in front of the latissimus dorsi in the axillary line than through the fibres of that muscle, or far enough forward to interfere with the pectoralis major. There is no objection to an incision through the latissimus dorsi except that it disables that muscle; it is deeper, bloodier, and offers no advantages whatever over the comparatively shallow incision necessary in the axillary line. The great objection to an incision in front of that line is the proximity to the heart and the greater difficulty attending drainage in that region.

An incision through the tissues into the pleural cavity may be made freely and quickly by means of a sharp bistoury, or it may be made upon the needle-pointed trocar devised by Dr. Cabot. The advantage of this trocar is that one is assured of the presence of pus before the knife is introduced. This is a very neat and a very expeditious method of opening the pleural cavity. Another method is the introduction of a drainage tube through a trocar-canula. This method is unsurgical, incomplete, and should not be employed unless a trocar of such great size is used as to permit the introduction of a large drainage tube. use of this method results in the introduction of a drainage tube so small as to be of no value. Finally, we have the method of free incision. This is to be preferred in all cases where the patient's condition justifies the time necessary for its performance, and consists in a cut two or three inches in length down to the body of the rib itself, and parallel with it. An inch or more of rib is separated from its attachments, lifted from its bed, and excised.

The pleural cavity is then opened by a longitudinal cut at the bottom of the space occupied by the excised portion of rib. By this method the intercostal arteries and nerves are avoided and most satisfactory drainage established. The drainage tubes are next introduced and the contents of the pleural sac allowed freely to escape.

The tubes should not be less than a quarter of an inch in total diameter. Two of these of rubber, placed side by side in the method first described by Dr. Cabot, and fastened into a shield, make a drainage with which no fault can be found. The tubes may be fastened together by a safety-pin, or may be sewed into the shield with one or two stitches. It being necessary frequently to change the tubes for purposes of cleanliness, several sets should be used. When not in use the tube with its shield should be left in an antiseptic solution after having been thoroughly washed. On the whole, the rubber drainage tube is the best, although it has some disadvantages.

The dressings for an acute empyema should consist of sterilized gauze and absorbent cotton. They should be large enough to absorb, without staining, the discharges of at least half a day. If it is not considered desirable to establish a valve action, either in the dressing or in the tube, it makes no difference how they are applied. It is well to make the layer next the skin of sterilized cotton, and to cut out a small space into which the projecting ends of the tubes fit. This prevents obstruction to the discharge, and also pain from the direct pressure of the bandage. If the lung does not expand, tubes with valves may be used to create a vacuum, by the pressure of which expansion may be promoted. The first which I used was difficult to keep clean, and the valve action, though quite satisfactory, interfered with drainage. The most effectual valve that I have ever used, and one which theoretically answers the purpose to perfection, is made by covering the small dressing which I place about the tube with rubber pellicle. The ends of the tubes beyond the shield are left about an inch in length. A dressing of some greater thickness than this, with a circular place about two inches in diameter cut out, is placed about the tubes. Over this part of the dressing, which is absorbent cotton, a sheet of rubber pellicle about six inches square is placed. Inspiration sucks the pellicle down upon the tube openings and no air can enter. Expiration is perfectly free and unimpeded. By this method it is absolutely impossible for air to enter, unless the dressing becomes deranged. A most perfect valve action is established. Theoretically this would seem to be a most desirable thing. Unfortunately, experience does not justify one's expectation. A few efforts at coughing produce a vacuum in the pleural cavity greater than can be satisfied by the expansion of the lung. This causes a constant suction upon the valve, nothing escapes, and the intra-thoracic pressure has to be satisfied by the exudations from the inflamed pleura. When a sufficient amount of pus has formed to overcome the vacuum pressure, it will begin to escape. It is quite evident that this state of things is most undesirable. Abundant clinical evidence has convinced me that the lung will expand not only without the aid of valves, but in spite of any impediment that may be placed in its way. In the majority of cases, especially in children, it is impossible to retain the tube in position after a certain time; the lung expansion forces it out. In many carelessly attended cases the tube has been forced out in spite of efforts which are made on the part of the physician to replace it. Unfortunately, in a great many cases of empyema, the opposite is true: the tubes are taken out too soon and pus re-accumulates. It is much better as a rule, therefore, to leave the tubes in until they are so forced out that they can no longer be replaced than, by their too early removal, to bring about a re-accumulation of pus with its renewed and increased constitutional disturbance. An opening so large as to permit perfectly free circulation of air during the movements of respiration is followed by quite as rapid recovery as the most effectual valve dressing or valve tube. method is of great service, however, in those cases where for any reason the lung does not expand by the ordinary efforts of respiration.

In free incision and drainage there is less danger than in aspiration. It is quite evident that where a large amount is being drawn off by suction, the state of equilibrium existing between the displaced or contracted thoracic viscera may be seriously disturbed, and the patient may thereby be in great danger. The use

of the aspirator exerts upon the displaced heart and the contracted lung more or less pressure. To satisfy the vacuum the unyielding thoracic wall necessitates a shifting of all the thoracic viscera towards their normal position. The heart becomes violently replaced, and the lung must make excessive efforts at expansion. If the heart has become fixed in its new position, and if for any reason the lung cannot expand, we have a state of extreme commotion in the thoracic cavity which may be attended by alarming or fatal consequences. On the other hand, when the thoracic cavity has been freely opened by the introduction of a large drainage tube, or by the removal of a portion of rib, the pus escapes at first in a stream, being under more or less pressure. As soon as the intra-thoracic pressure has been relieved, there is equilibrium. No pus goes out, nor does air go in. In a short time, however, air enters with each movement of inspiration and a corresponding amount of pus escapes. At the latter part of the operation, the air rushes in to fill the space left by the evacuated fluid, and a state of equilibrium is maintained in which the patient is exposed to no danger. In my experience none has attended the numerous permanent openings made. In a comparatively small number of aspirations I have repeatedly seen most violent symptoms.

The thoracic cavity having been freely incised, and there being no check whatever to the evacuation of pus or to the entrance of air during the movements of respiration or of coughing, the moment for expansion has arrived. At this time it is important for the patient to cough or to make violent contractile efforts upon the thoracic cavity. The mechanism of lung expansion is very important, and its success depends almost entirely upon a perfeetly free drainage. In the involuntary acts of coughing or sneezing, as well as in the voluntary expulsive efforts of the abdomen, the closure of the glottis plays an important physiological part. In the beginning of a cough or a sneeze, and during voluntary abdominal contractions, the glottis is closed and the thoracic cavity is contracted. When pressure is exerted upon the healthy lung, with a closed glottis, air rushes across the trachea into and through the primary bronchus of the other side, and the lung is expanded. This is shown clinically during the operation by the jets of pus

which escape during the involuntary coughing which is almost always set up by this procedure. Later, as the pus is being evacuated, air escapes. With each effort at coughing the lungs become more and more expanded; and at times during the manipulations of the operation itself the pleural sac becomes nearly obliterated. That the lung does not completely fill the cavity at once, is due to the fact that there is nothing to keep it expanded, except the adhesions which form between the opposing pleural walls. Several days are necessary for these adhesions to become strong enough to maintain the expanded lung firmly against the thoracic wall. That the lung should expand at all, or that it should stay expanded, has always seemed to me a remarkable thing. It is suggestive of a body being lifted in the air and kept there without support. In the formation of adhesions, however, we must find the explanation for this phenomenon, and anything that will hasten such formation is to be desired. It is in this that the use of antiseptics has its most important bearing. The absence of septic pus formation makes it possible for the inflamed pleural surfaces quickly to become united, and for the whole pus cavity to become obliterated.

At the close of an operation for acute empyema, one should be able to hear air going in and out with the movements of respiration. So long as the air does not do this, the operation is not complete, and the case is not likely to be one of quick recovery. It is quite evident that if anything blocks up the tube, or if the air cannot enter with perfect freedom during the efforts of respiration and coughing, the lung will be impeded in the process of expansion. For this reason the drainage-tube must be large enough to allow a perfect circulation of air.

If the drainage of the pleural cavity is perfectly free, washing out with any solution is of doubtful efficacy. The truth of this statement is seen in the effect of injecting a large quantity of water. In such cases it is obvious that the recently formed adhesions between the pleural surfaces will become separated. It is a good rule to follow, that large injections into the pleural cavity should not be used, except when the discharge has a bad odor. If injections are used for the purpose of washing out pus, this is a sufficient reason for additional operative interference and

the establishment of better drainage. Irrigation solutions are dangerous if we use any except the non-poisonous ones. Where there is an odor, a solution of chlorinated soda, not stronger than one part to ten parts of water, should be used. This is one of the best injections that I know of. It is absolutely harmless, and it destroys the odor more quickly than any other. Styrone, 1-200, in my experience, has given excellent results. The solutions originally used, especially of carbolic acid, are extremely dangerous, and I discarded them long ago. Carbolic acid poisoning was present in many of my early cases, and in one or two exerted a very unfavorable, if not a fatal, influence. This is true not only of the washing out of the cavity with a solution of carbolic acid, but in the simple application of dry carbolic dressing. The free circulation of air through the dressing and into the thoracic cavity has been followed by the volatilization of carbolic acid and its subsequent absorption through the pleura. In one case no carbolic acid whatever was used except on the instruments. This, in a child, was followed by the usual symptoms of carbolic acid poisoning. Washing out the thoracic cavity, therefore, except as mentioned above, should not be employed. In case, however, there are clots of fibrin or other semi-solid bodies in the pleural sac, boiled water should preferably be used. The pleural surfaces absorb with great rapidity, and all poisonous solutions, for this reason, should be avoided.

Occasionally the operation, especially if it be done blindly by one incision through all the layers over the intercostal space, is followed by profuse hemorrhage. The only place in the intercostal space free from artery is in the middle. The superior branch of the intercostal artery runs directly in the groove on the under surface of the rib, and the inferior branch upon the upper surface of the lower rib, either of which may cause considerable hemorrhage. This may easily be controlled by the use of a drainage tube so large as to cause pressure upon the surrounding parts, or by packing about the tube with gauze.

The intercostal nerve may be compressed by the tube, and a severe neuralgia follow. The pain is generally transitory, and is often referred to the terminal branches of the nerve, or may correspond to its distribution.

The most important element in the prognosis of acute empyemas, treated surgically, is the family history. Where there is a strong taint of tuberculosis in the immediate family of the patient, lung expansion will probably not take place. The prognosis depends also upon the length of time during which the lung has been compressed. In several of my cases the pleural cavity had been distended by pus for months. In such, although it is not impossible for the lung to expand, yet the chances of a favorable issue are not good. This is especially true if there be the slightest tuberculous taint.

The prognosis is good as to recovery from the immediate effects of the operation when performed early; but the remote mortality is necessarily large. Many of my operations were performed when the patient had been so much reduced in strength that death seemed a matter of a few hours. Under such circumstances it was necessary to open the thorax with the least possible shock. It would not be fair to say that in such cases fatal results were due to the operation.

CHRONIC EMPYEMA.—In the treatment of chronic empyema I shall consider how art may aid nature in shortening the exhausting and dangerous process of long-continued suppuration which inevitably occurs in all cases where, for any reason, the lung fails sufficiently to expand and close the pleural cavity. The changes that take place in the thorax and its contents, where nature unaided tries to effect a cure, when after drainage the lung has failed to expand and a large cavity remains, are well illustrated by the following case: ---, a man of thirty-five years, was attacked in June, 1881, with acute pleurisy accompanied by a very large effusion into the left pleural cavity. The family history was not good, his sister having died of consumption. He was aspirated once or twice by Dr. Bowditch, and a very large amount of serous fluid was drawn. His symptoms were extremely grave, dyspnea was excessive, heart much displaced, and constitutional symptoms severe. Early in July I withdrew by aspiration eighty ounces of cloudy fluid which contained a small amount of pus. No permanent relief following, and his symptoms increasing in severity and causing serious alarm, a free incision

and permanent drainage were advised. This was done with great care on July 19, 1881. The lungs did not expand, though long-continued efforts were made to bring about this result. A very large cavity existed up to June, 1885, with a daily flow of about two ounces of pus. In June, 1885, the size of the cavity was very much less than at first, the left side of the thorax having fallen in considerably, the right lung greatly expanded, and the diaphragm arched high up into the thorax. Nature had done everything up to that time to obliterate the space between the lungs and the ribs, and nothing prevented the skin and soft parts from sinking in and filling up the space except the firm and unyielding bony walls. This case shows the prominent features of an unfavorable case of empyema.

Up to 1879 no radical operation had been proposed to effect a permanent closure of such a cavity by surgical measures. Before 1876 several writers suggested the operation of resection simply as a method of free drainage, with the exception of Simon, who observed the effect of the operation as a means of causing the chest wall to collapse and thus diminish the size of the cavity. Simon's observation was confined to those cases in which but one or two ribs had been cut. Up to 1879 no operation had been performed upon the ribs with the purpose of contracting the chest wall. In 1879 Estlander published an article on resection of the ribs in chronic empyemas, in which he advocated the removal of ribs for the purpose of allowing the chest wall to collapse upon the contracted lung. This operation, which has since been known as the thoraco-plastic operation of Estlander, consisted in the removal of from three to six, and sometimes more, ribs, sub-periosteally, below the axilla, where there are no large muscles. He gave in detail eight cases where the operation had been done by himself. The ages of the patients varied from twenty-one to fifty-six years, and the duration of the disease from three months to twenty. In all the cases the usual antiseptic opening had been made. There was abundant discharge, and their general condition was not good. These cases resulted in five recoveries, two deaths, and one uncertain. Est-

<sup>&</sup>lt;sup>1</sup> Nord. Med., Stockholm, 1879, 11, No. 21, pages 1 to 14.

lander's method of operating consisted in exposing two ribs by longitudinal incision over the intercostal space, incision through and removal of the periosteum, and cutting through the ribs with strong bone forceps. If more than two ribs were resected, another incision similar in position and extent was made. Having exposed the thickened pleura, a small opening was made through the periosteum, which was dilated with Bigelow's dilator. There was seldom any hemorrhage, and that ceased when the rib had been raised from its bed. The only difficulty experienced was where the ribs were so close together that it was almost impossible to get between them. In such cases he used an elevator. In one case he made a vertical incision and several cuts at right angles to it, making a long and tortuous channel difficult to drain. Speaking of the cases in which long-continued suppuration had reduced the patient to an extreme degree, and which one might consider bad subjects for resection, he says that the operation causes very little disturbance and but little pain, and finally he sums up his article by saying that resection should be done while the lung is in great part contracted and the ordinary methods of free incision and antiseptic injections have failed; but not, however, until the pleura has become much thickened, which condition he considers essential for safety and cure, and not in any case where the patient may otherwise be diseased, either by amyloid or tubercular changes in other viscera, so as to preclude the possibility of recovery. Estlander also speaks of making several cuts in the ribs at intervals along their extent in order to provide for still greater powers of retraction in the bony wall.

Since the original article of 1879 this operation has been done by many surgeons and many cases have been reported. Several modifications have been proposed. The most important is that of Schede. In some cases the excision of ribs, as proposed by Estlander, for some reason does not result in the entire closure of the cavity. In such cases Schede has removed the whole thoracic wall in front of the cavity and brought the skin in contact with the pulmonary pleura. Sprengel, in Dresden, proposed a modification of Schede's operation. This method consisted in removing two ribs sub-periosteally in nearly their whole extent,

in making a long cut through the costal pleura as far as the limits of the empyema, parallel with the ribs, and then in clearing out the cavity of the empyema thoroughly with a sharp curette and tamponing with antiseptic gauze. Further healing of the case was left to nature, and took place by the shrinking of the pleura and the drawing in of the skin from all sides. A perfect cure resulted, though of course the function of the lung could not be restored. During the process of cure the skin was drawn so far into the cavity that it lined a part of it. The raw surface between its edges healed by granulation and cicatrization. In Schede's operation the pleural surfaces are also scraped, and the adherence of the skin to the lungs causes a boatshaped depression in the chest wall. Up to the present time the above methods are the most important in these cases of long-existing cavity.

A cavity in the pleura may be of long standing, owing to insufficient drainage. Such cases are not rare and generally require the removal of portions of one or more ribs. Such a condition of things is seen after the permanent opening has been made and the tubes removed before the cavity has fully healed. Where the tubes have been in for a very long time, a growth of bone will be found on adjacent sides of contiguous ribs which may be so extensive that it will be found impossible to dilate the sinus sufficiently for the evacuation of the cavity.

The second, and by far the most important indication for resection of portions of several ribs, is found where the cavity has existed for a long time and the process of contraction has come to a stand-still. In such cases the expansion of the lung, contraction of the chest wall, and arching upward of the diaphragm have diminished as much as possible the size of the cavity, and yet one remains large enough to keep the patient reduced in strength, and, by its free suppuration, to be a constant menace to life from the ever-present danger of tuberculosis and amyloid changes in other organs. It is here that we must look for the most urgent indications for extensive resection of the chest-wall. It is my experience in cases of purulent pleurisy that a family history of tuberculosis is a most important element in

the prognosis. If there be a direct family influence in this direction, the chances of recovery after permanent opening, with complete closure of the pleural cavity, are extremely small. In a large number of cases of empyema, opened early in the disease, there has been no recovery where there has been such family taint. It does not follow, and it has not been my experience, that a good family history renders the result unqualifiedly good, but the number of failures is very small indeed.

This operation is contra-indicated in all cases where the lung is hopelessly diseased, or where amyloid changes have appeared in the liver, kidneys, or spleen. In some cases the strength of the patient may be so reduced that he cannot safely undergo the shock of resection. In this, as in all surgical operations, there must be a careful exercise of judgment and common sense, and the patient should not be advised to run a risk too great for his strength, without careful consideration of the chances of recovery from the immediate effects of the operation itself.

Before deciding upon the number and extent of ribs to be resected, the cavity should be studied with great care. The shape and extent vary greatly. In some cases there is a shallow cavity which is as extensive as the chest-wall itself. I have found that at times the sound goes upward as far as the apex of the lung and downward and inward to the centre of the diaphragm. The lung will be found to be symmetrically contracted in all directions, though the depth of the cavity may not exceed one or two inches. In other cases, the upper part of the pleura will have been filled up by expanded lung and a shallow cavity will exist corresponding to five or six of the lower ribs. As a rule, the lowest ribs will be shut off from the cavity by the raising of the diaphragm. In other and frequent cases, the cavity is quite circumscribed, and requires but a small incision and limited resection to close it. In the cases where a very extensive cavity exists, the depth will sometimes be found to exceed an inch or two, and even be so great that we must conclude that the lung has failed to expand at all. Resection in these patients will accomplish nothing but a diminution in the size of the cavity and a lessening in the amount of pus, without effecting a perfect cure. An operation, to be successful, must be very extensive indeed. It is in such cases that Schede proposed to remove the chest-wall and bring the skin in direct contact with the pulmonary pleura. Under such circumstances, I believe that resection should be first performed in Estlander's way, and, if necessary, a more radical operation done later. This is better, also, because it will be found that the patient's strength will improve, after the first operation, sufficiently to enable him to undergo the second and more severe one with much greater chance of immediate safety and ultimate success.

In studying the technique of this operation, we must bear in mind the mechanical process by which the size of the cavity is to be diminished. If we take out a portion of one rib an inch in length, on the cadaver, we find that it will be impossible to bring the cut ends together, although we may approximate them slightly. The cut ends will sink in as far as the attachments of the intercostal muscles admit, which will not be far. If we take an inch from two ribs, the amount of depression and consequent approximation will be a little greater. If we take an inch from six or eight ribs, the amount of depression and approximation will be so great that the cut ends can be easily brought together, and the pleural cavity very much reduced indeed. The amount of reduction will depend more on the number of ribs resected than on the length of the excised pieces. When two or three inches are removed and the cut ends brought forcibly together, the chest-wall sinks in upon the lung so freely that it is very evident that a cavity of great size may in this manner be immediately obliterated. The total lessening of the circumference of the thorax is proportional to the number of ribs resected and the amount taken. I have shown this fact by resecting from four to ten ribs on the cadaver and observing the manner in which the ribs sink in. The sternal ends move upon their cartilages and will sink into The vertebral ends move upon their articulations and do not become so easily depressed. In some cases, especially in adults, there is so much stiffness that considerable effort is necessary to make the ends fall to the desired depth. In order to force these extremities into the required position, a good suggestion was made by Dr. Monks during my observations upon the cadaver, which as yet I have had no opportunity of using upon the living—namely, that the divided ends be forced together and kept in position by means of wires. This would insure the immediate diminution of the size of the cavity, and it could be seen at once whether the operation had been thorough enough. In all cases where the ribs are not forced into the desired position, they sink in of themselves. I have no doubt, from my own experience, that they do not become depressed in this way as much as they might, and that in some cases new bone is formed before the cavity is entirely closed, which, after a time, will prevent the further contraction of the chest.

I have used all the incisions recommended and have come to the conclusion that the best, in most cases, is the vertical cut. If there be an old sinus remaining from a previous operation, it will be necessary to make an incision over the intercostal space in which it lies, in order to take out the rib above and below. All the other ribs can be reached with the greatest ease by carrying up the vertical incision. It is seldom necessary to carry it downward because the bottom of the cavity is almost always at the sinus, or even above it, if the space selected were below the seventh. By this incision any number of ribs may be exposed, and sufficiently large pieces removed.

In considering how long a piece of rib to remove, we must return to the mechanical process by which the cavity is to be closed. If the thorax were, on horizontal section, a perfect circle, it would be very easy to say how much must be taken from the length of the rib to allow the cut ends to meet at the required depth. Taking into consideration the shape of the thorax and the obliquity of the ribs, I have found that approximately the length of the excised piece should be about the same as the depth of the cavity, where this is extensive and symmetrical.

Whatever method be selected, the operation should not be performed for at least six months after the primary incision. The lung should be allowed to expand as much as possible, and the other means used by nature given a fair trial. When all has been accomplished that can be expected, unless there are signs of failing strength or amyloid disease elsewhere, resection should be advised.

Where one rib is to be excised there should be a cut over the

rib itself three or four inches in length, down to and through the periosteum along the centre of the bone in its long axis.

In extensive resections, the length of the pieces having been previously determined by a careful study of the cavity, a vertical incision should be made in the axillary line long enough to include all the ribs to be excised.

The periosteum of the ribs above and below the sinus is incised longitudinally and lifted upward and downward, so that the vessels, nerves, and pleura are separated with it, and saved from being injured by the cutting to follow. It is very difficult to raise the ribs above and below the sinus, because new bone frequently forms about the tube-hole and unites them firmly together. Having once succeeded in separating and lifting these two ribs high enough to introduce the bone forceps, the first cuts are very easily made, and the pieces of bone removed. The other ribs can now be resected with great rapidity and ease. A great deal of time is saved by the use of strong bone-cutting forceps. They do not splinter the bone if they are sharp and closed suddenly with great force. If they are closed slowly, or if they are not sharp, they crush rather than cut the bone, and necrosis of the ends may follow.

This method is simple, and its constitutional effects are very slight. I have used all the incisions recommended by others and two of my own. The first case by one longitudinal cut; the second by two longitudinal cuts; the third by two long vertical cuts without any transverse ones; the fourth by one vertical cut from which four ribs were easily taken, and one long vertical cut from which four also were taken. In all later operations I have used the vertical incision. It is very easy to remove four ribs through one cut, either longitudinal or vertical. I prefer the vertical cut as giving better drainage.

The use of the chain-saw is not necessary, and it makes an operation very long which should be very brief. I have not made a counter-opening in any case, though I should do so when the diaphragm is raised so as to make the channel of drainage long and difficult. In such cases it is best to make a small opening and dilate with Bigelow's dilator, to avoid the hemorrhage that would follow free incision through the enormously thickened pleura. It is very important that drainage should be perfectly

free. The largest-sized tubes should be used, and two of them. This operation, if it does nothing else, provides a drainage so free that it would be difficult to obstruct it.

The immediate results in operations for chronic empyema are very gratifying. There is, even in cases which are not ultimately cured, a marked diminution in the discharge, so that after the operation, as the chest-wall sinks in, the amount of pus steadily diminishes, and either disappears entirely, or, at the end of a few weeks, reaches a small fixed daily quantity. It is possible, therefore, to determine very soon just how successful the procedure has been. If a cure has not been effected at the end of six or eight weeks so that the discharge has practically ceased, a question of further and more extensive resection must be considered.

The remote results I have been able to follow in many of my cases. In most, the cure has been permanent. In two cases there has been a recurrence of the disease after several years of health, and death from tuberculosis.

For a shallow, symmetrical cavity, such as is usually found in cases of chronic empyema, the resection of from two to eight ribs, after the method of Estlander, will be quite sufficient for its complete obliteration. For those enormous spaces left when the lung fails to expand at all, one may have recourse to the formidable procedures of Schede and others, but only in the absence of tuberculous diseases of the lungs or amyloid changes elsewhere. Even if everything be favorable for the operation, it must be borne in mind that the immediate mortality in such cases is large, and that a successful result is quite doubtful.

### DISCUSSION.

Dr. Alfred L. Loomis. I can fully indorse all methods proposed for the treatment of empyema in the paper just read. In my opinion the principle which Dr. Richardson inculcates, as regards the opening in the chest, is the only safe one, and the only one which will be found satisfactory in a large number of cases. The management of acute empyema is generally not

difficult if the opening is made early. But in chronic empyema you have a different condition of affairs, one in which the future of the case, after the operation, it seems to me, depends altogether upon the extent of the connective-tissue formations in the pleural cavity. It seems to me that this decides the final result in all those cases.

# THE INJUSTICE OF REGARDING SUGGESTED MEANS FOR TREATING PHTHISIS AS ATTEMPTS TO DISCOVER A SPECIFIC CURE.

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It seems as though a few appropriate words can be said under the title which I have chosen, in support of views already expressed, notably by Dr. Charles E. Quimby in the Medical Record for January 17 of the current year. And further, it seems appropriate that the true investigator should have his position more accurately understood, and a reciprocal sympathy expressed between those who are making a personal effort in their management of phthisical cases. By "personal effort" is meant the expenditure of labor and energy which has cost something, such as falls to those who are compelled to watch and meet the varying symptoms which develop in phthisical progress.

Seven years ago it was my duty to submit my professional work for criticism, and when it was deemed advisable to put certain restrictions upon the use of the pneumatic cabinet, a resentful feeling was occasioned in members of the profession who did not inform themselves of the necessities which made such a course expedient. The late developments in the use of Koch's tuberculin show the wisdom of the attempt that was made to confine its use to careful observers. It is not an agreeable duty for any one to assume censorship over medical practice, and if it were only to prevent a misapplication of a method or theory we might waive the duty; but it is hardly necessary to state that there are the most extravagant ideas prevalent in regard to what has been attempted in the way of remedial measures for tuberculosis; and encouraged by the popular expectancy and credulity there are those who are legally qualified to satisfy the curiosity of the suffering public, who have not the judgment or the strength of character to refrain from it; hence we have the cruel disappointment of the one, and the indifferent sarcasm of the other.

Sufficient reasons can be found in the experience of the pioneer to justify strict measures to protect a proposed plan of treatment from being heralded as a specific. Nothing is so sure to impair the usefulness of a measure as to create a reputation which it cannot maintain. It is impossible to assume any responsibility for results which are the outgrowth of feeble comprehension and imperfect application. One who has unravelled a mystery, or made a nice application of a theory, should have the privilege of indulging in a little of felicity of expression without being considered, as indeed he may be, a dangerous enthusiast. If enthusiasm may be considered a harmless error, there are others of more importance, which may creep into original work, which must be corrected by sympathetic co-operation, or by forcible and competent opposition, in order to secure a perfection which will make it safe for general adoption.

The idea of a specific for established tuberculosis is an absurdity.

The genesis of the impression that the medical world is all ageg over the "new specific" originates with the enterprise of the secular press, which seems to have gained some measure of profit by making agreeable terms for advanced sheets of some of the medical journals. It is natural and right for a physician to be on the alert for everything that is a real advance in our methods, but that man was rash, who, in the early experience with tuberculin, injected a patient, in whom tuberculosis was but an inference, and in whom none of the usual symptoms of reaction was produced; and when in open discussion upon the results of the use of tuberculin, he referred to such case as one in which a satisfactory result was obtained, he really did nothing for his patient or for science which justified the comfortable honorarium of twenty-five dollars an injection.

That man lacked discriminating ability who referred to a means "as a mere toy," which will impart to intra-vesicular air the barometric equivalent of shooting the patient, if need be, to the altitude of two thousand feet in a second of time, affording the only known means of effecting involuntary expansion at the time

and place where the ambushed bacillus is playing its deadly part in the mechanical stasis. A suggested form of treatment must properly contend against a conservatism from men of ability; and he who may, fortunately or otherwise, submit a method which he has calmly concluded is capable of producing certain results, should be eager, though he may be compelled to be patient, to learn the opinion of those of larger experience.

To one who is disposed to throw discredit upon any means the task is simple enough, and frequently an easy conscience has been satisfied by subjecting a hopeless case to a course of treatment, with the implication that if the treatment does that case any good there must be "something in it," or per contra.

There is a class of practitioners who, upon occasion, especially with the laity, will profess a familiarity with every question propounded, even if it be a garbled press account of a brilliant essay, far beyond their ability to discuss.

They generally give a quasi-approval or a cautious denouncement which seeks to secure credit for great erudition. Such practitioners are the ones most likely to adopt suggestions without discernment, especially if it can be done with paper and pencil, or a hypodermic in the privacy of the professional relation. Such considerations as these compel the honest investigator to hesitate before submitting his work for criticism.

I have said that the idea of a specific for tubercular phthisis is an absurdity. I do not mean to say that a given case or a series of cases cannot be arrested by appropriate treatment. Agencies which have accomplished such results are just so far specifics for the conditions which they have relieved; but etiological factors must always be taken into consideration; for instance, who has been so unfortunate as not to have arrested syphilitic phthisis?

Analogy suggests that the gradations in the severity of the symptoms which appear in the first stage of tuberculosis must depend largely upon the cultivation and consequent viability of the bacilli with which each separate case becomes inoculated. Parallel conditions seem to be met in syphilis, vaccination, in the acute infectious and malarial fevers. It is equally important to estimate the vital resistance of the subject of tubercular infection.

Non-bacillary phthisis varies in its pathology and etiology from

year to year; for this reason, we can explain the frequency of non-febrile consolidations and passive pleurisies, which we have been treating during the past year as sequelæ of *la grippe*. Epidemic infectious pneumonia is apt to leave a more serious phthisis than is croupous pneumonia.

Tubercular pleurisy is a primary lesion, pointing to a local expression of a systemic invasion from the ingestion of tubercularized milk or other nourishment. All these conditions not only forbid the hope of the discovery of a general specific, but they demonstrate the necessity for accurate diagnosis, supplemented by nicely adapted treatment.

Humility is the most becoming spirit with which to submit a new treatment, but anything with merit will survive a more ignoble birth, and it is not for naught that so much effort has been made to control the tubercular condition.

Truth will prevail, and as advance follows advance each fact will take its merited rank regardless of feeble advocacy, and oblivious to jealous denunciation.

It was with the feelings here expressed that the writer introduced the pneumatic cabinet to the profession in January, 1885; since which time it has been used by him as principal and auxiliary treatment in all pulmonary diseases, substantially as described in the Journal of the American Medical Association for May 7, 1887.

One hundred and fifty-nine cases of tuberculosis, which had progressed beyond the first stage, have been treated.

Sixty-one deaths have occurred. In fifty-four cases the results are unknown, principally because of the failure to produce any satisfactory improvement in the beginning of treatment, such cases becoming discouraged and have dropped out of observation.

Forty-four cases are living, and have had the following periods of arrest:—

2	cases	•		٠	8	years.
4	66				7	4.6
4	"				6	66
10	66				5	66
8	"				4	66
4	6.6				3	66
7	**				2	6.6
5	66				1	year.

The word "recovery" is withheld in deference to the opinions which have been expressed as to what constitutes a recovery in phthisis. Moreover, it has not been possible to classify the cases according to the distinction, which can frequently be made out by the presence of bacilli.

Fibroid cases will sometimes show bacilli without any concomitant severity of symptoms. A prognosis, which was formerly based upon the fact of the presence of bacilli, must be modified until further biological research can be made concerning their life history.

While the one hundred and fifteen cases seem to militate against the treatment, there are facts which, as they have occurred, have been as conclusive of the beneficial influence as the most complete arrest in any of the forty-four cases.

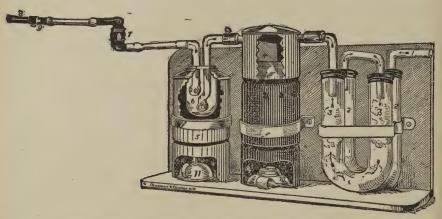
I refer to pronounced improvement where it was unreasonable to expect any improvement, to temporary arrest in six cases where it was possible for each to pursue his daily avocation, and finally it seems to the writer, that with a prolongation of life there has been a corresponding shortening of the lingering period of helpless suffering.

The number of cases in the primary stage which have been treated cannot be stated, but of the entire number only those cases characterized by early and intense febrile excitement have failed to yield.

All primary cases after a period of expansion, and, as is confidently believed, efficient antiseptic medication, are advised to seek climatic influence, and as a consequence of the preliminary treatment I am convinced that a more rapid and thorough recovery takes place. It is not necessary to refer at length to its potent influence in the pretubercular condition and all minor affections of the pulmonary tract. I will refrain from reporting in detail the results of many attempts to secure a more perfect means of preparing agents for use in connection with the cabinet treatment.

The principal outgrowth of such effort has been the construction of the instrument here shown, a description of which was given in the New York *Medical Journal*, August 23, 1890. It was called a Vaporizer, Sublimer, and Air Sterilizer. The salient features consist in passing air through the U-tubes, when

it becomes strained and dried. On reaching the hot-air drum it is sterilized and expanded by the heat from the lamp. It then passes into the vaporizing glass in divided currents, where it may not only absorb the equivalent of moisture lost in the drying tubes, but an excess in direct proportion to its expansion.



1, tube to connect with outside air; 2, 2 and 3, 3, U-tubes for holding drying agents; 4, diaphragm in hot air-drum to compel a free circulation of the air; 5, drum to hold vaporizing glass; 6, vaporizing glass; 7, gravity valve, unscrewing at centre, with valve inside; 8, mouth-piece; 9, opening in mouth-piece with adjustable cover to regulate expiratory force; 10, lamp for sterilizing drum; 11, lamp for vaporizing drum; 12 and 13, connections.

The air thus saturated becomes the respiratory medium, an adjustable opening in the mouth-piece regulates the expiratory force, which act causes the saturated air to impinge against such tissues as confine it.

It is believed that this instrument provides all the advantages there may be in topical medication to the lungs, with increased advantage of constant and well-directed respiratory exercise.

My patients use the instrument as a home treatment supplementary to the more thorough pneumatic differential process.

### DISCUSSION.

DR. J. H. TYNDALE. I am sorry to say that I am more than astonished to find that a man of Dr. Williams's erudition should still even as much as refer to attempts to find a specific for tuberculosis. I judge from his language that he refers to bactericides, when we know that that standpoint has been entirely abolished. The standpoint, I take it, can now be summed up in a few words: The endeavor to neutralize the ptomaines (and in this connection I am glad that Dr. Shurly's paper has been read); the building up of the general condition by the remedies suggested by Dr. Robinson (arsenic, hypophosphites, etc.); and last, but not least, and forming only one of the features of treatment, the expansion of the previously paralyzed lung by various methods, a series of which were detailed yesterday by Dr. Otis, and one of the best of which is Dr. Williams's cabinet. thought that Dr. Williams knew that the therapy of the present includes all these various lines of treatment, and particularly excludes for all time to come any effort to kill the bacilli by any direct method.

Dr. Karl Von Ruck. I have had experience with the pneumatic cabinet in some 300 or more cases. In my experience nothing can be expected of germicidal inhalations with the view of attacking the bacilli, simply because the remedies inhaled and the tubercle bacilli never come in contact; not even in the mouth, pharynx, and larynx have I seen any curative influence upon tubercular disease from such inhalations. The spray from soothing remedies, stimulants and astringents to the mucous membrane of the respiratory tract, when inhaled do have a controlling influence upon the catarrhal processes, which is a decided, although frequently only a temporary gain.

The pneumatic cabinet has been a much abused apparatus, because it has been used, not for what it can do, but for what it was hoped to do, namely, cure consumption.

Patients have been subjected to treatment with it, because they had lung disease, instead of because this lung disease presented indications which the cabinet was capable of complying with.

Like many other means it has not fulfilled our expectations, because we have expected the impossible.

Its chief indication in pulmonary tuberculosis is for the production of a better circulation through the lung, which it certainly will accomplish if judiciously applied, and if that were all that is necessary, it would cure the disease.

The good influence upon the circulation is manifested upon the pulse for hours after its use, and also the circumstantial evidence that in several hundred patients, in whose cases I have made more or less use of it, we never had a single occurrence of hemorrhage, or bloody expectoration during the periods of its employment, and among these cases were a number who had a history of frequent hemorrhage and bloody sputum.

In several cases the present bloody expectoration ceased promptly upon its use.

The pneumatic cabinet is also useful for the accomplishment of a better ventilation of the affected lung, and for the recovery of collapsed air-cells and lobules, which would otherwise become atrophied and lost.

Its use is contra-indicated in all acute inflammatory processes and complications, and also where, from increased lymphatic absorption, a distinct rise of temperature follows its application. It appears with its employment, as well as with all other useful means, that the influence it exerts is favorable to the local and general nutrition, and the restoration or improvement of impaired functions, leading to, or aiding in, the accomplishment of a physiological cure by connective-tissue formation and fibroid encapsuling of the tubercular deposits as indicated in the paper presented by Dr. Loomis.

Dr. H. F. WILLIAMS. I would like to say, in reply to Dr. Tyndale, that my paper will furnish a complete answer to his astonishment at the fact that "I am still hunting for a specific for tuberculosis." When I began the practice of medicine I was all anxiety to do something for lung-troubles on account of an inherited tendency, strange as it may seem, in myself in that direction. I had not practised medicine for five years when I declared that I would not treat another case; but it was not long before I had other

cases in spite of my vow, one case especially that recovered under the most adverse circumstances. Then I started again with a conception of an intrinsic tendency toward repair in the pulmonary tissues, a tendency so strong that it overcomes gravity and resists a fundamental law of advanced surgery, namely, thorough drainage. For many cases of recovery have dried cavities in the upper lobes of the lung.

There must be some special tendency toward repair in the pulmonary tissue; else, not only phthisis but pneumonia and the acute inflammatory affections, would be more fatal. I am rather optimistic to-day, and less willing to give up any point I have tried to make in reference to producing antiseptic effects than ever before, although doomed to disappointment in the use of many agents, and compelled to contrive new means of introducing such agents as have antiseptic power. Before a result can be obtained from any agent, it must be prepared in a manner to make the pulmonary circuit. A means is being used to-day which is promising more than any I have yet tried, but I have not sufficient facts to make any further reference to it. Dr. Richardson spoke to-day of the absorptive power of the tissues around and about the thoracic cavity, and we have but to mention the ease with which gases and vapors are absorbed.

I have no sympathy with those who are willing to discard all effort to produce pulmonary antiseptic action; neither am I deceived in regard to the problem of reaching the protected bacilli. There are other germs and various fermentations which may be antagonized. I am sure that I have circumscribed tubercular processes by keeping accessory lobules and lobes aseptic and probably antiseptic, and I am unwilling to relinquish the hope of doing even more. I have not felt justified in experimenting with the many proposed plans of treatment which have been in vogue, but not because of any idea that they may not be of ultimate value. I have been deeply interested in the scientific discovery of Professor Koch, and await with much solicitation the result of Dr. Tyndale's mature conclusions with reference to the use of vaccine lymph which he proposes.

## THE SULPHUR WATERS OF RICHFIELD SPRINGS, N. Y.

By CHARLES C. RANSOM, M.D., NEW YORK.

At the head of one of the small valleys which extend from north to south through the central portion of New York State, at an elevation of 1700 feet above sea-level, lies the village of Richfield Springs. It is immediately surrounded by hills rising 300 to 400 feet above the plain, which protect it from the strong winds prevalent at this elevation, and give it in summer an equable and agreeable climate. The soil is sandy, with a slight admixture of clay. The adjacent hillsides are covered with well-tilled farms, with here and there a patch of woodland, giving to the surrounding country an attractiveness and beauty which, by the tired and over-wrought patient, are as much appreciated as the delicious air itself.

The thermometric records kept for the past nine years show the average mid-day temperature during the month of July to be 77°, and during the month of August to be  $72\frac{1}{2}$ ° Fahr. The nights, however, are invariably cool, and necessitate the use of warm blankets even in midsummer. The barometric mean is estimated at about  $28\frac{1}{2}$  in. Electrical disturbances are not infrequent; and the air is dry, pure, sweet, and exhilarating.

As the majority of cases treated at Richfield are those in which sudden atmospheric changes are productive of pernicious results, it will be seen that the location and environment of Richfield are most favorable.

Not only has nature contributed her most healthful gifts to make Richfield an ideal curative resort, but man has done all within human power to utilize nature's forces so that the land, the water, and the air may retain their native purity. About one hundred and fifty feet above the level of the village are two large reservoirs which are fed by springs from the surrounding hills and by underground pipes from a natural lake which the springs have formed still higher in the mountainous ridge. As the water leaves the reservoirs it is passed through Hyatt Filters and then carried into the village with a gravity force that takes it to the highest points with tremendous flow, thus providing perfectly wholesome drinking water and, at the same time, an almost limitless flushing of the sewers.

The village is drained and sewered by a complete system, which was designed by Prof. D. M. Greene, and is known as the "gunbarrel" system. Many competent experts, including Engineer Ernest W. Bowditch, of Boston, and Dr. Balch, of the New York State Board of Health, have given Richfield's sewer system careful inspection and pronounced it the most perfect of any village in the State.

The business interests of the village are practically entirely concentrated on the care of summer guests, so that there is a conspicuous absence of smoke, dirt, and the general slothful appearance of back-yards which mar the healthfulness as well as the beauty of so many small towns. Favored with bracing, mountain air, laden with the strength of balsam and pine, with pure spring water gushing from the hill-sides, with a rolling lake country that presents kaleidoscopic changes of scenery, and with enterprising inhabitants who realize that their business is dependent upon the sanitary cleanliness as well as the appearance of their village, Richfield is admirably adapted for the location of the mineral springs and the application of the medicinal waters of which you have requested me to speak.

The bathing establishment is situated in a beautiful park in the centre of the town and within easy reach of the many hotels and boarding-houses. The main front of the building faces southeast, and the entrance doors open directly into a large pump-room in which is the mineral spring. This spring is depressed below the floor, and surrounded by a railing, a disposition enabling a large number of persons desirous of drinking the waters being conveniently served at one time. At the rear are the entrances to the

main hall of the building; from this hall access is gained to the several bath-rooms and rooms designed for special treatment.

The hall is divided by the staircase leading to the second story into two wings, which, in turn, are united at the foot of the stairway by a rotunda. To enter the main hall on either side it is necessary to pass the ticket office, which is so divided as to enable ladies and gentlemen to obtain their tickets on opposite sides. The ladies' baths are placed in the right-hand wing of the building, and the men's baths in the wing on the left-hand side. Each bathing-hall has, in connection with it, a large resting-room. The bath-rooms are fitted with the most approved porcelain bath-tubs and fixtures.

Into the rotunda open the entrances to the private bath-rooms and to the Turkish baths, a similar separation being made in the arrangement of these rooms as in that of the bath-hall wings. There are provided four private bath-rooms on either side for patients desiring special treatment or more exclusive accommodations; and the Turkish baths proper have hot-rooms, douche, massage, steam, and reclining-rooms, plunge-baths, etc. steam-rooms and baths are so arranged that the sulphur vapor is exclusively used in them. The douche-room, which is modelled after those at the Établissement Hydrothérapeutique Medical de Paris, Rue Mirominel, is located in the Turkish Bath Department, the reclining-rooms of the latter being used for patients of both departments. At the rear of the building, and connected with both the bath-halls and the Turkish baths, is a large swimming-bath, the pool of which is forty-two feet long and seventeen feet wide, and from four and a half to six feet deep at either end.

In the southern corner of the building and to the left of the main hall are the "respiration-room" and the sun-bath. The latter of these rooms is circular, surrounded by large windows and surmounted by a dome-skylight, from which a flood of sunlight falls through the entire apartment. The former is for the dry or gas inhalation, and is the method followed at Allevard, Savoy, France. In this room is a fountain from which the sulphur water is discharged from a small jet against the concave surface of a glass cylinder, whence it drops into a shallow basin;

from this it falls into a succession of larger basins beneath. By this means the gases are liberated, and the room, which is kept closed, is filled with the disengaged gas. Into this room the patient enters without change of clothing and breathes the medicated air.

To the right of the main lobby is the consulting-room of the physician in charge, connected with which are a waiting-room, a room furnished with electrical apparatus, and a private bath-room for special treatment.

At the head of the stairs from the rotunda are the entrances to the inhalation- and pulverization-rooms. The inhalation-room is a chamber in which the sulphur-water is atomized either by compressed air or steam, for direct application to the throat or nose. Small rubber tubes carry the air or steam to small tables in various parts of the room. These tables are provided with standards to hold the ends of tubes into which are inserted glass atomizers. The invalid sits in front of a table, and sulphur-water, with or without any desired combination, is applied in an atomized state directly to the affected part.

The pulverization-room is an apartment in which the sulphurwater is minutely divided by a number of small compressed-air atomizers. The air of the room becomes saturated with the pulverized sulphur-water, like a fog or mist; and invalids, upon entering, protect their clothing with rubber cloak and hood. At either side of the second story are placed two gymnasia for ladies and gentlemen.

In and about the immediate vicinity of Richfield are a dozen or more natural mineral springs which vary but slightly in their chemical composition and may be classed with the calcic sulphur waters. The water which is exclusively used in the treatment at Richfield is furnished by three wells, coming from the earth at a depth of 120 feet, and furnishing 26,000 gallons per day, nearly twice as much as can possibly be used. The water from these wells flows into the large well in the pump-room, from which it is taken to supply the uses of the bathing establishment.

The analysis of the water, as made by Prof. Chandler, of New York, is as follows:—

### Analysis of the Great White Sulphur Spring at Richfield Springs, N. Y.

BY DR. CHARLES F. CHANDLER, Ph.D., Professor of Analytical and Applied Chemistry, Columbia College, N. Y.

Contains in one United States gallon of	Contains in one United States gallon of
231 cubic inches:	231 cubic inches:
Grains.	Grains.
Hydrosulphate of sodium . 1.7189	Bicarbonate of iron trace
Hydrosulphate of calcium . 0.0908	Phosphate of lime 0.0067
Sulphate of potassa 1.6656	Chloride of sodium 0.5249
Sulphate of lime 112.3389	Chloride of lithium 0.0165
Sulphate of strontia 0.0105	Alumina trace
Sulphate of barium trace	Silica 0.6515
Sulphate of magnesia 5.1498	
Hydrosulphite of soda 0.3801	Total 154.2835
Bicarbonate of magnesia . 31.7403	
Sulphuretted hydrogen	14.206 cub. in.

It will be seen that the amount of sulphuretted hydrogen is unusually large, exceeding that in the waters of Aix-les-Bains or Aix-la-Chapelle. It is doubtless to this principle that the efficacy of the waters is due.

In the treatment of patients these waters are used both internally and externally; though I do not depend much upon the internal use of the water, and in some cases dispense with it altogether. The reason for this lies in the fact that in certain cases the water seems to be difficult of digestion and produces irritation of the digestive organs with consequent depression of the system. I usually do not prescribe it when there is evident weakness of the digestive power, but when used at all in these cases it is ordered hot, when it seems to be better borne.

This is doubtless due to the fact that in heating the water the lime-salts are precipitated and a small amount of sulphuretted hydrogen is liberated. The effect of the water upon the bowels is variable, sometimes producing free catharsis for a day or two, but more frequently diminishing their action and necessitating the use of some mild aperient. It is my custom, when this condition exists, to use  $\frac{1}{10}$ -grain or  $\frac{1}{4}$ -grain calomel tablets; and much benefit is found in the slight stimulation to the liver which they produce.

The amount of water ingested varies from one-half to one ordi-

nary tumblerful taken one hour before breakfast and dinner. It is drunk slowly, and after drinking it the patient is directed to walk about for half an hour to aid in its absorption. I never order the water to be taken after dinner, as it is never well borne at that time.

Where there is marked digestive disturbance I prescribe the drinking of hot plain water before each meal, and I thoroughly believe in its value. In fact, it seems to me that the ingestion of large quantities of water adds materially in the treatment of most conditions which come under my care at Richfield; and I encourage the drinking of Vichy, Lithia, or any of the pure bottled waters, in addition to the sulphur water or plain hot water prescribed. The effect of the sulphur water taken in this way is to promote and increase the urinary secretion, which it does in a very marked manner, and it also increases to a great extent the activity of the skin.

The most frequent method of applying the waters externally is in the immersion or tub-bath. By referring to the description of the baths, it will be seen that there are in the bathing establishment at Richfield seventy rooms devoted to this kind of bath. The bath-tubs are commodious, and when filled, completely cover the patient with the exception of the head, which rests upon a broad band of welting stretched across the end of the tub. effect of the bath depends upon the temperature of the water and the length of time in which the patient remains in the bath. The temperature will vary from 98° to 108° F., baths below or above these temperatures being very rarely used. The time varies from six to twelve minutes. The immediate effect of the bath in most cases is a depressing one, amounting sometimes to extreme fatigue, with trembling of the limbs—a condition which exists from half an hour to two or three hours, when a reaction sets in restoring the patient to his usual vigor, and often extending to a point of exhilaration. If the depression immediately following the bath lasts longer than three hours, the reaction stage will be very slow, if it comes at all. Such an effect is to be avoided, as extreme debility is apt to follow a few baths of this kind. In prescribing the bath it is our object to determine, if possible, the point of tolerance of our patient; that is, to so regulate the temperature and time of the bath that we will obtain its effect as shown by the immediate depression following it, but which will insure prompt reaction afterwards.

This point of tolerance must be determined by experience with each individual patient, as it sometimes happens that those weakened and debilitated by a severe attack of rheumatism or gout will react more quickly than an apparently strong individual.

In the beginning, the bath is usually prescribed at 100° F. for eight minutes. It is taken in this way for three baths, when some idea of the effect can be obtained. Then the temperature and time are gradually increased or diminished as the needs of the patient seem to indicate. The reaction may be greatly facilitated by the care of the patient following the bath, and is a matter of great importance in every bathing procedure. Upon coming from the bath the patient's skin is in a very active condition and is usually covered with profuse perspiration. He is carefully dried, dressed in warm woollen clothing, which should be provided for the purpose, and is instructed to retire for at least one hour, or until the skin is cool and all sense of fatigue has disappeared. Reclining rooms have been provided in the establishment for this purpose; but, as the distance to the hotels and boarding-houses at Richfield is so short, I find that it is quite as well, and certainly more agreeable to the patient, to go directly to his room after the bath, and there regularly go to bed. I have never seen any ill results follow this procedure. Sometimes, on the day following the bath, the patient will experience some depression and weakness, notwithstanding the fact that the immediate depression of the bath was followed by prompt reaction.

In these cases it is the custom of some physicians to omit the bath on the second day, in order to allow the patient to recuperate. I do not sanction this procedure, as I believe that by it we lose much of the good effect or impression of the bath. The fault lies in the fact that the bath was too hot or lasted too long, which may be corrected by regulating the bath. I therefore insist upon the continuance of the bath every day, at the same time carefully regulating it. There is, however, a condition induced by the baths which almost invariably manifests itself after about a week's treatment, though I have seen it as

early as the fourth and as late as the fourteenth day. This is the condition described by writers on this subject as the thermal or bath-fever. Its symptoms are quite well marked and need never be confounded with the depression above referred to. There is marked frontal headache, usually of a dull, heavy character, though at times it may be severe or neuralgic, accompanied by general malaise or lassitude, with loss of appetite and usually constipation. The tongue will be coated, and there will be marked digestive disturbances with flatulence. I have never noticed any elevation in the bodily temperature, and, if it occurs, it must be very slight.

Suspension of all treatment for two or three days is usually sufficient to relieve this condition, though in certain cases small doses of calomel may be used with excellent results to assist in correcting it. As soon as this disturbance is overcome, the treatment may be resumed where it was left off and continued to the end without further interruption. I have never seen but one case in which it recurred during a course of twenty-one baths, and that was in the case of a lady who was under treatment last summer, in whom this disturbance occurred regularly after every fourth bath during the entire course. The ultimate effect of the treatment in her case was most pleasing, however, ridding her entirely of the rheumatism for which she was treated, and which has not recurred since.

In conjunction with the tub-bath, massage is used quite extensively and with admirable results. Massage-rooms, of which there are eight, are fitted with the porcelain tubs, as are the tub-bath-rooms proper, and have in addition a bed adapted especially to massage treatment. After the bath the patient is dried and placed upon the bed, where the treatment is given. Immediately after the bath is the most favorable time for this treatment, as the tissues are relaxed and greater movement can be given to the stiffened joints. Great care must be exercised in subacute cases, as the manipulations, if not carefully given, are very apt to light up the inflammation in a joint, when all treatment must be stopped until it has completely subsided.

The douche is used alone in certain cases and in conjunction with the tub-bath in most rheumatic and gouty cases. The ad-

vantage of the latter over the tub-bath lies in the facility with which special portions of the body may be shampooed and rubbed while the hot water is pouring over them and the parts are relaxed. In the case of patients where one or more joints are affected, the treatment by douche and massage is devoted exclusively to the affected joints for five or ten minutes; the patient is then put into a tub-bath, where he remains from four to ten minutes longer. The method employed in giving the douche is the same as that followed at Aix-les-Bains. The patient sits on a chair with his feet in hot water, and one or two douchers propel jets of hot water over the affected part, simultaneously shampooing and kneading the part, thus stimulating the capillary and general circulation.

The spinal douche is applied in quite another manner, and is indicated in an entirely different class of cases. In the treatment of insomnia by the spinal douche the effect is obtained by the difference in the degrees of heat employed, together with the force of the impact of the stream. The patient stands in a pan of hot water, and steadies himself by grasping two hand-rails provided for the purpose, at a distance of about ten feet from the doucher. A stream of water from a half-inch nozzle, at a temperature of about 100° F. in the beginning, is thrown upon the nape of his neck, and the stream is slowly moved down the spine to the extreme end of it, when it is carried up again to the starting-point. The temperature of the water is gradually increased until it is as hot as the patient can bear, usually from 110° to 120° F. This movement is repeated until the skin over the spine is very red and active. The hot stream is then taken off and two or three quick strokes of cold water are thrown up and down the spine; then a cool spray is given over the entire body from a large "rose" nozzle for a few seconds only. The patient is then quickly dried with hot sheets, wrapped in warm woollen blankets, and rests for from fifteen to twenty minutes, when he dresses and goes home to bed. The immediate effect of this douche is slightly stimulating. This feeling passes off in the course of an hour, and a restful, comfortable feeling, which is most conducive to sleep, takes its place. For insomnia, this douche is always best given just before retiring.

The Turkish and the sulphur-vapor baths are used as adjuncts to the general treatment at Richfield, and are seldom exclusively relied upon in any class of cases. The method employed in administering the Turkish bath is the same as that used in most Turkish bath establishments. In the sulphur vapor bath the patient sits in a large box with the head out through a hole in the movable top. The vapor from the sulphur water is turned into the box until the heat is as great as can be borne with comfort. The patient remains in this vapor for from seven to fifteen minutes, when he is taken out, rubbed and shampooed, and cooled off with the various showers and sprays. By way of variety, the sulphur-vapor bath is sometimes ordered; but no special importance is attached to its use, except in certain forms of chroniskin diseases where we wish to rid the skin of accumulated detritus.

Rheumatism and gout are the conditions to which the treatment at Richfield is particularly adapted, and the majority of patients who go there for treatment are sufferers from either one or the other. The effect of the treatment upon this class of cases is quite uniform, and a case that is not in some measure benefited is an exceedingly rare exception. It is frequently noticed, however, that the patient may not get relief from pain in the slightest degree while undergoing the treatment, and in fact the pain is sometimes even increased. Relief, after the course of baths is finished, is, however, almost invariably experienced, and an immunity from attacks during the succeeding winter is generally assured. My case records have not, as yet, been kept long enough to make them of any statistical value, but thus far I have sufficient memoranda of facts to warrant me in saying, that to my knowledge there is no treatment for rheumatism or gout that will give such good results as those by the waters of Richfield, as they are there applied.

In sciatica and other neuralgias, the water in conjunction with the douche have been very successful. Of eleven cases of which I have records, two were sent home cured, five were so much relieved that they had only occasional pain when over-fatigued, two were slightly benefited, while the other two got very little relief, if any, although the general condition of health was improved. The manner of giving the douche in these cases was different from those described as being used in rheumatic conditions. With these there was no shampooing, and the stream of hot water was thrown from the small nozzle with a great deal of force over the sciatic nerve and over the sacrum. In the beginning the force seemed to produce some pain, but the patient soon became accustomed to it and found it agreeable and soothing. The hot water was used until the skin was thoroughly reddened, a few strokes of cold water were then given to facilitate reaction, and the patient was immediately immersed in the tub-bath.

Insomnia has been relieved by the spinal douche taken before retiring in most of the cases which have been treated by it. In two cases the effect was very marked, and in one other, while the sleep induced was not unbroken, the patient said that when she awakened during the night she was not restless, as before using the douche, but felt soothed and quieted by it.

Two cases of jaundice resulting probably from catarrh of the bile-duct were greatly benefited by hot douches over the liver (with force), followed by the tub-bath and massage. The skin began to clear after four of the baths, and progress was rapid and satisfactory.

Of the skin diseases treated by the water and baths the best effect seems to have been in those in which disturbances of digestion and assimilation were the underlying cause; the different forms of chronic eczema, psoriasis, and the various disturbances of the sebaceous glands, as seborrhæa, eczema seborrhæicum. Two cases of urticaria were very much improved by a course of the baths.

In syphilis I cannot say whether or no the waters of themselves have any curative effect, as I have never treated a case of syphilis without potassium iodide or mercury in some form. I can say, however, that the drugs employed seem to act much more promptly, and are much better borne with the baths than without them. I have made no observations that would tend to confirm the idea that sulphur waters often reveal latent syphilis.

The treatment of chronic catarrhal conditions of the pharynx and larynx by the inhalation of the atomized sulphur-water has been in some cases very gratifying. The number of cases treated

thus far has not been sufficient to enable us to speak with much certainty as to permanent results, but the few good results obtained encourage us in believing that this method offers very much as a remedial measure.

I have until now purposely omitted speaking of the general care of the patient while undergoing treatment, for the reason that I wish to particularly emphasize its great importance. Without the strictest attention to the detail of diet and general regimen our medical treatment is often without avail. This is particularly true of the class of patients who come to Richfield, in nearly nine-tenths of whom digestive disturbances of some sort exist. This may seem an exaggeration, but I believe that I state facts.

In a general way the diet, of course, must be adapted to the individual needs of the patient, and no rules can be laid down that will apply to all. There is, however, a diet for the rheumatic and gouty cases, which it is my invariable custom to prescribe, and I very seldom have occasion to change it except possibly in the less important details. The patients are put upon a nitrogenous and albuminous diet. Fresh fruits, starches, and sweets are abjured. I permit patients to eat meat of any kind, except fresh pork and veal, twice or three times a day if they wish it and find no ill effect from it.

In pleasant weather moderate outdoor exercise is indulged in, and on disagreeable days the gymnasia are brought into requisition.

When patients are unable to take active exercise from debility or lameness, massage is used to keep up the activity of the tissues, and passive movements give strength to stiff joints.

In presenting this paper to you, it has been my object simply to describe the sulphur-waters of Richfield, the methods employed in applying them there, and to relate to you my experience with their use as remedial measures. The theory of their action and the possible scope of their usefulness I leave entirely for your own consideration.

#### DISCUSSION.

Dr. R. G. Curtin. I do not know that I understood Dr. Ransom's remark about the effect of sulphur baths in constitutional syphilis. I understood him to say that sulphur baths would sometimes develop the trouble in latent cases.

Dr. Ransom. No, sir. Some of the French writers say that sulphur-waters may develop latent syphilis. In my paper I said I had never made any observation that confirmed that idea, and from my experience alone I cannot believe it.

Dr. Curtin. My reason for asking is that at the Hot Springs of Arkansas I understand they use sulphur baths very extensively for the purpose of quieting, and they are very successful in cases which go there, some of which have defied long-continued rational treatment.

Dr. J. B. Walker. I would like to say a word about the development of latent syphilis. I believe that anything that irritates the skin will tend to bring it out. A gentleman who has passed through certain stages of syphilis, who is very observant of his case, has particularly called my attention to manifestations developed from local causes, and remaining for weeks afterwards as a local expression with syphilitic manifestations. The same condition was also caused by facing a freezing cold wind, and the resulting facial expression that had not before appeared was no doubt caused by the irritation. So that in the cases where it seemed to have been developed by sulphur baths it may have been due to the active effect of the sulphur upon the skin.

I would like to say a word about the diet in the treatment of these cases. Very probably the cases of rheumatism that go to the springs call for alimentary treatment which would not be applicable to most cases treated at home. Those cases that go to the springs are generally cases where more active alimentation is demanded. No doubt most cases of chronic rheumatism are sufferers from malnutrition. I believe that, as a rule, the diet for rheumatic and gouty cases is that which does not induce acidity; and further that no other dietetic law can be enunciated. With some, meats are imperatively demanded; with others, a mixed diet, neither vegetable nor animal food predominating, suits the case.

DR. CARL RUEDI. The treatment described as obtaining at Richfield Springs is very much the same as that at the Arkansas Hot Springs and the springs of Europe. If I remember correctly, at Baden Baden, Aix-la-Chapelle, and Aix-les-Bains they have to a great extent the same method of treatment as at Richfield. The only point of decided difference is in regard to diet. In Europe the diet is arranged quite differently from that at Richfield. Science teaches us to be very careful with the diet in cases of rheumatism and gout, and to be very careful about everything that might cause indigestion, to avoid fruits, fat, and vinegar, and sugar in many cases. The too liberal use of meat in itself is objected to. It would be very interesting if Dr. Ransom would give us some of the reasons why Richfield is so liberal with meat diet; whether the patients that go to Richfield are very much underfed and need building up, that Richfield has more to do with poor man's gout, or whether the water in itself has some especial power in connection with the treatment there.

Dr. Frederick I. Knight. I am sorry Dr. Garnett of Hot Springs, Arkansas, has not come. He promised to be here, but has been prevented by home affairs. He is very familiar with this subject, and I know we should all be glad to hear from him.

Personally I am glad to find some man who utters the protest which I have long felt against the doctrine which we have inherited from England in regard to the use of meat in these cases. I have felt for years that meat was a proper diet for a rheumatic patient; that we should exclude sugar and starch, but give him plenty of meat; and I have always steadily followed that practice. I have long been hoping to hear from somebody who would make that point and urge it sufficiently on the American people. I have seen a great deal of suffering and degeneracy from blindly following the teaching that comes to us from England, but which

does not belong to us any more than English theories about a green Christmas.

Dr. C. C. Ransom. I merely wish to correct a wrong impression that I think has been made in regard to diet at Richfield Springs. I did not say that the patients were allowed full diet. We do not allow them to have a generous diet, but I believe that a patient in a rheumatic or gouty condition is best served with nitrogenous food. I can correct digestive disturbance very much more quickly by its use than by the use of starches, and for that reason I have always prescribed a meat diet.

I do not know that any mineral water alone will modify or have the slightest effect upon syphilis. I have never seen or heard much about that. I think, however, that Dr. Curtin will find that in those cases at Hot Springs the patients receive some medicinal treatment, and of course that will render absolutely worthless all theories in regard to the effect of the waters themselves. If the water alone is used, then we can tell something about the effect of it. I have never seen any case of latent syphilis developed by slight external irritation of the skin, although such cases may exist. I doubt, however, if any medicinal water is a sufficient irritant of the skin to induce eruption.

DR. FREDERICK I. KNIGHT. The claim of Dr. Garnett in regard to the use of baths in the treatment of syphilis is, I believe, that it enables him to give very much larger doses of mercury without disturbance of the patient. That is one thing which I hope he will tell us about on some future occasion.

# AN EXPERIENCE WITH DIPHTHERIA AT A HIGH ALTITUDE.

#### BY WALTER A. JAYNE, M.D.

Having met with a number of cases of diphtheria while living at a considerable elevation above sea-level, frequent occasion has been offered to study at the bedside the possible influence of the climate in modifying the course and termination of this disease. In looking over the literature of this subject so far as it has been possible, few allusions to it have been found, and with the hope of contributing to a clearer understanding of the relation of the climate of a high altitude to diphtheria, I wish briefly to review some sixty-eight cases of the disease which have fallen under my personal observation in the Rocky Mountains at an elevation of 8500 feet above sea-level.

All these cases occurred in a mining-town and outlying districts, situated in an unusually healthful valley surrounded by high mountains. With a bountiful supply of good water, a porous soil of considerable depth, excellent natural drainage, and the pure air common to sparsely settled mountain regions, an outbreak of diphtheria would hardly have taken place had it not been for the soil in immediate proximity to the dwellings being saturated with filth consequent upon the almost universal use and neglect of cesspools and privy-vaults, when the more primitive method of throwing all refuse upon the ground at the back door was not followed.

The cases upon which these remarks are based include only those in which the diagnosis was beyond doubt. All other forms of sore-throat prevalent in times of diphtheria, so near the border-line that we are often in doubt as to their true nature, have been rigidly excluded. If examined for bacteria, many of these would probably have proven to be instances of the catarrhal form of the

disease described by Oertel (Ziemssen, vol. i. p. 596), or those in which the formation of the pseudo-membrane was promptly arrested, and by many classed as diphtheria. At the risk of largely increasing the apparent death-rate by the exclusion of many mild cases of the disease, it appears wise to use only such as presented a distinct and unmistakable pseudo-membrane. The manifestations of diphtheria are so familiar to all that I shall confine my remarks to a few salient features the disease presented, and such as may be thought to have been influenced by the existing climatic conditions.

Of the sixty-eight cases observed, thirty-eight were male, thirty female. As regards age, three were babes under one year, twentyone were between one and five years, seventeen between five and ten, fifteen between ten and fifteen, and twelve were beyond the age of fifteen years. Of these, seven were adults. The mortality was exactly twenty-five per cent., seventeen of the sixty-eight cases having proved fatal. Of these seventeen deaths, twelve were attributed to blood-poisoning and general prostration, one to interstitial or infective myocarditis, two to sudden paralysis of the heart after apparent recovery, one to suffocation from extension of the false membrane to the bronchial tubes after tracheotomy, and one to simple exhaustion in a laryngeal case, due more to antecedent empyema than to diphtheria. In any comparison of this mortality with that of other localities the rigid lines on which the diagnosis was made should be considered. This death-rate is increased by five cases which presented septic symptoms, and were all but hopeless when first visited. It may be proper to add that this outbreak occurred at a time when diphtheria was prevalent in many different parts of the United States, both East and West, including Colorado. In many places it assumed a severe and fatal form, and in the Northwest particularly exhibited great malignancy.

The mortality of diphtheria varies so greatly in different outbreaks that the general average cannot be accurately stated. Dr. Loomis¹ says the death-rate varies in different epidemics from twenty to fifty per cent., while Sir Morell Mackenzie² states that

<sup>&</sup>lt;sup>1</sup> Practical Medicine, p. 680.

<sup>&</sup>lt;sup>2</sup> Diseases of the Throat and Nose, vol. i. p. 166.

where a definite false membrane is present one-third at least will probably prove fatal. It would therefore appear that the death-rate of twenty-five per cent. here noted approaches that of the milder epidemics, and would indicate that in this instance the disease, while severe, did not exhibit any unusual virulence.

Classifying the cases according to the parts affected, we have thirty-two cases in which the disease was confined to the pharynx, including the tonsils and soft palate. Of these, but one died, a young colored child. In thirty-one cases the disease affected the pharynx and nasal cavities. Of these, fourteen died and seventeen recovered. In one instance, a very malignant case, the disease first manifested itself in the nose and extended downward to the pharynx. In all others the order of extension was from the pharynx to the nasal passages. In one patient of this class, a child of twelve, an extensive diphtheritic membrane showed itself in the vagina, and, before death, covered the vulva, giving rise to inflammation of the lymphatics of both groins. Four cases were laryngeal. Of these, two died and two recovered. In one patient, who recovered, the membrane was limited to the nasal cavities. In no case did the membrane extend downward from the pharynx to the larynx. In sixty-two of the sixty-eight cases the membrane first appeared in the pharynx, generally upon the tonsils. But one patient had a second attack. The first was of moderate severity, affecting the pharynx and nasal cavities; the second mild, the membrane appearing on the tonsils and soft palate only.

With the exception of the fatal heart cases mentioned, paralysis followed the disease in but few instances. No part except the soft palate was affected, and this invariably passed away in a short time without special treatment. No other sequelæ were noted, and convalescence was always remarkably prompt and satisfactory.

From this brief summary it is seen that of the seventeen deaths only three occurred in cases in which the nose was not involved, two of these being laryngeal. Twelve of the fourteen deaths were the direct result of septic influence, and it is not improbable that the paralysis of the heart in the other two was due indirectly to the same cause. It is proper, therefore, to conclude that about

eighty-two per cent. of the deaths in this outbreak resulted as a consequence of the extension of the disease to the nasal cavities.

Nasal diphtheria is always attended by great fatality, owing to the liability of blood-poisoning. According to Oertel, nasal diphtheria is excessively dangerous. Dr. Jacobi² says it is ever grave, while others have taught that it is assuredly fatal.³ This form of the disease occurred in thirty-two of the sixty-eight cases which came under my observation, and extension to the upper airpassages took place in thirty of the sixty-two commencing as pharyngeal.

If in this series of cases the disease presented any feature which may be considered unusual, aside from the remarkable absence of sequelæ and the very prompt convalescence, it was the frequency with which the nose became involved. No statements have been found concerning the relative frequency of nasal diphtheria, and I cannot, therefore, say to what extent, if any, this proportion of nasal cases varies from that observed elsewhere. It would, however, appear to be large. I was at first inclined to attribute this extension to the nostrils to antecedent catarrh of the nasal mucous membrane. After more extended observation and diligent inquiry, combined with my personal knowledge of the previous condition of many of these patients, this was found not to be the case. In very few could it be suspected the nasal diphtheria was preceded by a catarrhal condition, and I was forced to the conclusion that this extension was due, in the majority of cases at least, to those general causes which determined the disease to assume in these instances an increased virulence. posed to be the result of contagion were few, and any manifestation of virulence could invariably be traced to some unusually bad sanitary condition in the immediate vicinity. That the outbreak was due to essentially local causes was established by the striking amelioration in the severity of the disease, and its gradual disappearance, after rigorous sanitary measures were generally enforced.

Both during the outbreak and since, in reviewing the cases

<sup>&</sup>lt;sup>1</sup> Ziemssen, vol. i. pp. 608 and 666.

<sup>&</sup>lt;sup>2</sup> Pepper's System of Medicine, vol. i. p. 692.

and comparing my experience with diphtheria at sea-level and in Colorado, I have sought to determine what, if any, influence the climate at this high altitude had upon the character of the disease and its mortality. In making such comparison it must always be difficult to avoid error, and ascribe to each modifying factor its proper influence. It is particularly so here. Under ordinary and apparently similar conditions the character and fatality of the disease vary within very wide limits. Dr. J. Lewis Smith<sup>1</sup> says that no infectious disease presents greater differences of type or severity, and Dr. Welsh,2 reviewing the question as a bacteriologist, tells us that the bacillus, as obtained from different cases of diphtheria, varies in its virulence, as tested upon animals, to a greater degree than any known pathogenic organism. If the essential factor in causation is so very variable in its manifestations under the apparently uniform conditions which obtain in laboratory work, until we know fully and definitely the reasons for these great variations, we cannot hope to correctly generalize and compare one epidemic with another, attributing its mildness on the one hand, its severity on the other, to the proper cause.

The climate of a locality is supposed to have little to do either with the development of diphtheria or with these variations. Dr. Edward C. Seaton,<sup>3</sup> in his address on diphtheria before the recent Congress of Hygiene and Demography, expressed the opinion of most writers on this subject in saying that no climate gives immunity from the disease, though the tropics suffer less than cold and temperate climates; calling attention further to the prevalence of the disease in strikingly different degree in countries in the same latitude and with similar climatic conditions, and also in parts of countries close to each other. At the same meeting Dr. Schrevens<sup>4</sup> asserted that the altitude of a locality did not probably exert any great influence.

While we recognize the slight influence of climate in the causation of diphtheria, we are not fully informed concerning the precise conditions of the atmosphere which favor the variations mentioned.

<sup>&</sup>lt;sup>1</sup> Diseases of Children, p. 279, 5th edition.

<sup>&</sup>lt;sup>2</sup> Medical News, May 16, 1891, p. 555.

<sup>&</sup>lt;sup>3</sup> Lancet, August 15, 1891, p. 374.

<sup>4</sup> Ibid.

The rarity of the air at high altitudes would probably have no influence except as favoring other conditions, as low temperature and dryness. A moderate temperature may be favorable for some forms of germ-life, and possibly for the diphtheria bacillus, though of this we have as yet no evidence beyond the observed fact that the disease prevails more commonly during the spring and autumn than at other seasons. The knowledge that moisture is essential to the development of all forms of bacteria would lead us to suppose that, given the favorable local conditions, the degree of dampness, both of air and soil, was the determining factor retarding or favoring the multiplication of this bacillus.

In the experience here detailed it was in the late summer and fall months, when the weather was still warm and the ground well moistened after the numerous summer showers, that I met the largest number of cases and those exhibiting the greatest severity. A fact in the life history of this bacillus explains why this is so, as well as the persistent recurrence of the disease. Dr. Welsh¹ tells us that the diphtheria bacillus is among the more resistant of the non-spore-forming class, and that it withstands desiccation for months, but that dampness and moisture are particularly favorable for its development.

The favoring influence of moisture is spoken of by all writers on diphtheria. A state of dryness should therefore be unfavorable except for the dispersion of the desiccated germ; and we are perhaps justified in assuming on theoretical grounds that the very dry climate of Colorado, and possibly of most high altitudes, tends to check rather than to favor the multiplication of bacteria and the development of the diseases dependent upon them. That the climate of high altitudes, and particularly that of Colorado, has such a restraining effect upon the tubercle-bacillus is well established, and I believe it is the case with pyogenic bacteria. It is a common observation of surgeons practising in Colorado that wounds of every description heal more kindly and more often by first intention with less strict antisepsis than in a moist climate at a lower elevation. I am inclined to the belief that the same holds good as regards the diphtheria bacillus.

<sup>&</sup>lt;sup>1</sup> Medical News, May 16, 1891, p. 553.

The opinion has been expressed before this Association¹ that the virulence of diphtheria is rather increased than diminished by the altitude and by the rarity and low temperature of the air, but I fail to find any basis for this view either at the bedside or in theory.

In the experience here narrated, while many cases of the disease assumed a septic form, these occurred only under the very worst local conditions, and even with this environment a very fair majority of the bad cases recovered, and convalescence was remarkable both for its promptness and freedom from the numerous annoying and dangerous sequelæ elsewhere observed.

I would conclude, therefore, that until strong evidence to the contrary is presented we have good grounds for the belief that, given equally unsanitary surroundings, diphtheria would more quickly develop, and assume greater virulence, in the more humid atmosphere common at low elevations than in the dryer air characteristic of most high altitudes, and that the degree of elevation per se is not a determining factor.

#### DISCUSSION.

Dr. Karl von Ruck. I have had no experience at all with diphtheria at a high altitude, as my practice at Asheville has been confined entirely to pulmonary cases. Something should be said of the method of Dr. Seibert, who claims to obtain very excellent results with submucous injections of chlorine water. I believe Dr. Tyndale understands the practice, and I should like to hear from him how it is carried out.

Dr. J. H. Tyndale. Dr. Ruck is mistaken about my knowledge; but I have seen Dr. Seibert perform that little operation with his syringe not introduced under the membrane, but into the submucous connective tissue. It is only used for tonsillar diphtheria. He does not claim that he uses it in any form of diph-

<sup>&</sup>lt;sup>1</sup> Transactions American Climatological Association, 1889.

theria not connected with the tonsils, but he has been very successful with chlorine water in the cases of this class.

Dr. Edmund J. A. Rogers. I only heard the latter part of Dr. Jayne's paper, but I can entirely indorse all that I heard. I have found in Denver, in a majority of the cases which have become far advanced before treatment, that the disease almost universally spreads to the nose. In fact, as a case becomes severe, I always begin treating the nose, because I expect that the disease will reach that locality in a day or two.

Another point that I should like to emphasize is the influence of moisture in the propagation of these germs. When I first went to Denver, one of the old practitioners there told me, during one of our wet springs or fall snow storms, to then look out for diphtheria, as he had always found that it developed with the melting snow.

I have had intimate knowledge, during the present year, of the health-statistics of Denver, and it is a well demonstrated fact there that the only disease that has not wonderfully abated during the present wet season—and this has been one of the wettest seasons ever known in Colorado—is diphtheria, and that that has held its own. Against the argument that diphtheria is very much influenced by dryness is the fact that we have, in the dry climate of the West, a great deal of diphtheria, quite as much, I think, as in moister climates. In Denver it is one of our scourges, and, next to typhoid fever, it is the disease we most dread. However, I personally must say that, since I have learned not to be afraid of the free use of mercury in the treatment of diphtheria, it has lost much of its terror.

Dr. R. G. Curtin. May I ask the gentleman in what form he uses mercury in his cases of diphtheria?

Dr. Rogers. My favorite preparation is a solution of bichloride of mercury, a grain to the ounce. I usually begin with a ten drop dose every two hours. If at the end of twelve hours I see no influence on the membrane, I double the dose, and so continue to increase until I see some effect. In the case of a child five years old, I should give up to one-twenty-fourth of a grain every hour for twenty-four hours. In fact I have come to think that the only limit to the dose is the effect on the membrane. I am not at all afraid of it. As compared with the results I obtained previous to using it, I am wonderfully satisfied with it. A fatal termination is not nearly as frequent as before I went boldly into the use of this remedy, mercury. I use in combination with it tincture of chloride of iron internally and solution of peroxide of hydrogen locally in the throat, and boracic acid solution in the nose.

A gentleman asks me whether we have much nephritis, and whether bichloride of mercury affects it. Nephritis has been, I think, the cause of two-thirds of my deaths, but since using large doses of mercury I am quite sure that I have not seen nearly so many cases of nephritis as before.

Dr. W. C. Glasgow. I should like to ask the experience of those present who have used the bichloride of mercury in the treatment of diphtheria. I have used it extensively during the past few years and the results have been very unfavorable. Very many cases have died with symptoms of uraemic poisoning, and I have thought it possible that this result might have been brought about by the use of the sublimate. Acute diffuse, or desquamative nephritis certainly occurs as the result of the diphtheritic poisoning, but the great number of cases occurring consecutively in my practice have raised grave doubts in my mind as to the entire safety of the sublimate treatment. This may have been simply a coincidence; but, recalling my experience when the disease was treated with iron and chlorate of potash, when deaths with uraemic symptoms were very rare, I have been induced to raise the question and to ask the experience of others.

I think the peroxide of hydrogen one of our most useful remedies. It seems to exert a twofold effect—mechanical and antiseptic. The formation of gas tends to raise the membrane and to separate it from its attachment, while as an antiseptic and a cleansing agent it cannot be surpassed.

DR. ROGERS. At one time I used turpentine on the membrane, and I have found nothing so quickly effective; but I had much

the same experience that Dr. Glasgow complains of with the mercury; I lost so many cases by nephritis that I began to think it was from the use of turpentine. I always decreased it as soon as I had destroyed the membrane, but still I became afraid of the turpentine.

I now incline to think that the nephritis was due rather to the epidemic than to the remedy. That my experience has been the opposite of Dr. Glasgow's in the occurrence of nephritis has probably been due to a change in the form of the disease, not to our use of either mercury or turpentine.

Dr. W. A. Jayne. I am glad to hear Dr. Tyndale's indorsement of Seibert's method of injecting the tonsils with chlorine-water. I have been much interested in the statements I have seen of this plan of treating diphtheria, and some time since provided myself with a Seibert's syringe. No suitable case in which to apply it has yet presented itself, but I shall certainly use it at the first opportunity.

Regarding treatment, the course I pursue is somewhat similar to that described by Dr. Rogers. I commence with a calomel purge, and follow it by full doses of quinine and hourly doses of mercuric chloride. As to local treatment, I personally make one or two thorough but gentle applications of a 1 to 200 or 1 to 500 solution of the mercuric chloride to the affected portion of the throat, being careful to first remove all secretions. I then direct the hourly application of a ten or twenty volume solution of hydrogen peroxide, and afterward of diluted tincture of the chloride of iron. Early, and before the appearance of any disease in the nostrils, I endeavor to cleanse and disinfect the nasal mucous membrane, and for this purpose have latterly used a very weak bichloride solution with apparently great success. If there are evidences of the extension of the diphtheritic process to the nose, I use a weaker solution of hydrogen peroxide with possibly the bichloride once a day. When the disease is increasing or at its height I find no difficulty with the ten or twenty volume solution of the hydrogen peroxide, but as the false membrane separates it causes pain and must be reduced or stopped. My results have distinctly improved since I have used the mercuric chloride freely

in conjunction with the other remedies mentioned. It is of the greatest importance to attend to the local treatment early. In the early stages we have a decided power over diphtheria; and in a very large proportion of cases our treatment, if it does not check at once, will materially modify the subsequent course of the disease.

I have not ascribed any deaths, that I have seen, to nephritis simply. Nephritis has been present in many cases of bloodpoisoning, but I have regarded it as incident to, and one of the many effects of, this condition. I have never observed any injurious effect upon the kidneys resulting from the use of the mercuric chloride.

I have tried carbolic acid and abandoned it, as I have every other drug which injures or destroys the epithelial layer of the mucous membrane, since I believe that every such remedy does harm by rendering the membrane more vulnerable, any solution of continuity produced being a new point to which the false membrane will extend or from which it may develop.

#### THE PRE-TUBERCULAR CONDITION.

#### By J. HILGARD TYNDALE, M.D.,

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Consumptives may be divided into three classes, according as the lesions are:—

- 1. Infiltration caused by mechanical pressure—the result of fixed pleuritic adhesions on the one hand, and of connective-tissue proliferation and contraction in the lung itself (so-called chronic peribronchitis) on the other.
- 2. Infiltration as a remnant of acute disease, or of as yet strictly localized tuberculosis, the bacillus having forced an entrance into non-resisting cells.
- 3. More or less rapidly diffusing tuberculosis, preceded by a lowering of the general condition.

The first two start out with *local* conditions at a time when there is a good or fair general condition. The third class takes its starting-point from an *impaired general condition*, and it is of this I wish to speak.

I hold it as a maxim that *localized* tuberculosis does not endanger life of itself, so long as the general nutrition begets a reasonable resisting power of the pulmonary tissues. Hence, where the starting-point is an impoverished nutrition, we are dealing with the true pre-tubercular condition.

My starting-point, then, is general malaise as yet unaccompanied by any physical signs in the lungs, not even by modifications in rhythm or pitch of breathing. I will not dwell upon predisposition or acquisition, any more than to say that, beginning with feetal life, colonization of the bacillus is favored by—

- 1. Transmission with the ovum, kept in latent abeyance.
- 2. Inherent inability, in bodies built after the type of phthisical habitus, of the leucocytes to digest the bacillus tuberculosis.

Acquisition of the bacillus in later life is favored in the apparently healthy by—

- 1. Insufficiency in anatomical development of the thorax.
- 2. Insufficiency in physiological expansion, as in ossification of the cartilages.

These two conditions of lessened mobility of the chest, and a consequent stagnation of air, are shown in a tendency of the *upper* lobes to tubercular invasion.

3. Parts of lung confined by pleuritic adhesions afford facility for a prolonged lodgment of the bacilli; they receive both board and lodging for a term sufficient for their development. This is especially true of the *lower* lobes.

From the above causal elements I now coin this general maxim: Constructive or destructive metabolism is inherent in the person.

Now let us consider the true pre-tubercular condition, both in the constructives and destructives.

To clear my path of obstructions, let me briefly exclude considerations of age, sex, or race; influences of previous general disease (typhoid fever), or of still present general trouble (syphilis, diabetes), also remnants of acute lung disease; suppurating wounds or other septic sources within the body; cheesy glands in the neck or axilla as sources of direct infection. All these latter are centres of infection from demonstrable local sources.

Now, excluding all general and local diseases enumerated above, we see our way clear to the true pre-tubercular condition. We are consulted by a person who complains first and foremost of general malaise. This general malaise is readily shown to be composed of partial failure of several or all functions of the body—inability to exercise the motive power (muscular debility) known as feeling "sawed off in the legs;" sensation either more acute or dulled; sleep either fitful or too profound—always extremes; variable digestive capacity; superficial breathing, and last, but not least, a rapid heart's action. In other words, there is a falling off in the daily routine of eating, breathing, elasticity in walking, refreshing sleep, a buoyancy of mind, to which are added vague disturbances of sensation. As yet, there is no elevation of temperature. This is the rough picture of the general condition

—by inclusion, if I may so call it. By exclusion, you will now find acute diseases (typhoid fever, for example) absent; likewise chronic ones, of which diabetes may serve as an example.

We now turn to the local condition and find that, as yet, inspection, auscultation, and percussion furnish no clue whatever, not only as to dry and moist râles, but not even as to changes in the respiratory elements of quality, pitch, or rhythm. This leads us to our second maxim: All more than temporary removals from well-being of which the patient has been conscious for weeks or perhaps even months, and which cannot by careful diagnosis be made to fit into the frame of a recognized acute or chronic functional or organic trouble, represent the true pre-tubercular condition. Correct appreciation of the pre-tubercular condition can only be arrived at by exclusion.

Nothing remains now but to sharply outline the exact sequence of events in the pre-tubercular condition; and to make the picture as clear and distinct as possible I shall divide the events into stations. Please bear this in mind: I am to give in a few words the whole course of the pre-tubercular patient's disease from beginning to end, and desire it to be remembered that the first station is entirely made up of subjective symptoms and represents the true pre-tubercular condition. The second and third stations are made up of the same subjective malaise, plus the objective findings in the lungs, and merge into well-known types of tubercular invasion.

Station first—Subjective. General malaise, not fitting into the frame of recognized acute or chronic disease; in this respect comparing to neurasthenia, also diagnosed by exclusion. As stated above, general malaise is a falling off from the individual norm of eating, breathing, muscular power, refreshing sleep, buoyant mind, etc. This impaired general condition leads up to the local lesion, both subsequently uniting to bring about destruction.

Station second. The above subjective symptoms plus the objective change in the character of the respiratory elements; but as yet no râles, either dry or moist.

In the second period the general condition has advanced to noticeable loss of adipose tissue in some, or of red blood-corpuscles to the verge of pernicious anemia in others, or both combined. The order of importance in respiratory changes in auscultation are (1) quality, (2) pitch, and (3) rhythm. The changes now occurring are in the reverse order of their importance—rhythm first, then pitch, then quality. This is the main point I wish to emphasize. Rhythm: Interrupted (cog-wheel) inspiration, a pause not existing in the norm, a prolonged and audible expiration. Pitch: Higher than the original vesicular low pitch. This holds good of both auscultation and percussion, in accord with Dr. Leaming's great law: low pitch denotes porosity, high pitch denotes density. Quality: From vesicular to broncho-vesicular, and finally bronchial, or tubular as I prefer to call it.

Station third. Dry followed by moist râles and gurgles, according to whether the tubercular invasion begets a localized or widespread bronchiolitis or local excavation. The third station for pre-tuberculars, then, is either a direct rush into diffused tuberculosis (general bronchiolitis, or tubercular pleurisy) in those of destructive metabolism, or a more gradual destruction by infiltration and excavation, perhaps with subsequent limitation, in those of constructive metabolism.

In conclusion, I offer the following maxim: The pre-tubercular condition is an as yet undemonstrable tubercular invasion, engrafted upon those whose nutritive changes have brought them to a condition below par as compared with their usual physiological standard. This physiological unit is strictly and absolutely individual.

## THE EPIDEMICS OF INFLUENZA OF 1890 AND 1891 IN CHICAGO.

By E. FLETCHER INGALS, M.D., CHICAGO.

THE epidemics of influenza occurring in Chicago during the last winter and the preceding year differed from each other considerably in their effects upon the respiratory and digestive organs and upon the nervous system.

In 1890 the disease made its appearance at about the first of January, but in 1891 not until nearly the first of March.

Persons of every class, all ages, and either sex were attacked; but, as indicated by the observation of Dr. J. Suydam Knox,¹ children suffered from it much less than adults. However, Dr. Charles Warrington Earle² saw many cases in children who, he thought, experienced the same symptoms as adults. From my own observation it appears that children were much less frequently affected than those of more advanced years.

The exact period at which influenza first showed itself cannot be determined. Four or five weeks preceding the actual beginning of the epidemic many patients suffered from acute rhinitis and sore throat which were often termed influenza, though they did not appear different from or much more frequent than the colds which prevail in ordinary years. However, during this same time there occasionally occurred cases presenting the peculiar symptoms of sudden fever, malaise, great prostration, and aching of the muscles, which have been so noticeable during the two epidemics. These isolated cases presented all the characteristics of influenza and doubtless were of that nature; and it is probable that the peculiar condition or conditions causing them

had more or less to do with some of the cases of acute rhinitis and sore throat just referred to.

The statistics of the Chicago Board of Health show that in 1890 there were 64 deaths in January from influenza, 37 in February, and 7 in March; and that in 1891 there were 4 in January, 6 in February, and 155 in March.

These, however, cannot be taken as accurate indications of the prevalence of the disease, for the returns are made by practitioners of all kinds, many of whom during the reign of the epidemic, in order to retain the good-will of their patrons, found it expedient to confirm the diagnosis of *la grippe* which had already been made by the patient or his friends. However, as pointed out by Dr. N. S. Davis, in these same months there were a larger number of deaths from pneumonia, very many of which were due to the influenza as a primary or complicating factor, and the prevalence of inflammation of the lungs may fairly be taken as an indication of the extent and virulence of the epidemic.

In 1889, the year preceding the first occurrence of the epidemic, which was an average winter, there were recorded 384 deaths from pneumonia during the first three months; 128 in January, 111 in February, and 145 in March.

In 1890, the first year of the epidemic, during the same period there were 1096 deaths from pneumonia, and in 1891, during the same period, 1233, of which 280 were in January, 233 in February, and 720 in March. The greater development of nervous diseases, as shown by Dr. Archibald Church,<sup>2</sup> is also to some degree an indication of the extent of the epidemic.

As the character of the disease became pronounced its accession was usually marked by a mild degree of inflammation of the mucous membranes, with lassitude, weariness, pain in the muscles, more or less distinct chill, and fever ranging from 102° to 105° F. The pain was usually of a neuralgic character, and frequently disappeared within one or two days. In some instances the mucous membrane of the eyes and ears, in others of the respiratory passages or digestive organs, and in still others of the urinary tract, was most affected.

<sup>&</sup>lt;sup>1</sup> Chicago Medical Recorder, p. 458.

Dr. F. C. Hotz' observed a large increase in the number of cases of conjunctivitis, both in dispensary and in private practice, though there was nothing peculiar about the inflammation. More frequently he noticed inflammation of the cornea ushered in by symptoms of acute irritation similar to those caused by a foreign substance under the conjunctiva. These were always confined to one side and were of two types: in one there was a zigzag line of superficial ulceration beginning at some point on the border of the cornea and travelling towards the centre, always confined to the surface-layer of the corneal epithelium; in the other the surface of the cornea showed no disturbance, being smooth and brilliant, but on close examination by focal illumination small, round gravish spots were found located in the deeper layers of epithelium. In these latter cases the pain and sensitiveness of the eyes, the quick reaction to the slightest touch, and increased secretion of tears, were very marked. These were easily mistaken for simple conjunctivitis, if the cornea were not brilliantly illuminated by focal light. In these the congestion of the conjunctiva was pronounced, but did not show that dense red zone around the cornea usually characteristic of inflammation of that tissue. The superficial ulceration recovered quickly, but the latter variety was of slow progress, and two months was the shortest period in which the eye recovered its normal condition, though the ultimate prognosis was good in both varieties.

In the treatment of these cases cocaine was the only local remedy which gave even temporary relief. Mydriatics seemed to act indifferently, or even to aggravate the irritation. Quinine internally had a decidedly beneficial effect on the neuralgic symptoms.

He observed numerous cases of inflammation of the middle ear, some of mild form causing the patient but little pain or inconvenience, except a feeling of fullness in the ear, tinnitus, or a buzzing sound with slight deafness. In others the inflammation was more severe, attended by rapid secretion of fluid, deep congestion and marked bulging of the drumhead, with violent neuralgic pain in the ear radiating over the side of the head. In

<sup>&</sup>lt;sup>1</sup> Chicago Medical Recorder, July, 1891, p. 413.

these the hearing was speedily lost, and sometimes the drummembrane was perforated within the short space of twelve hours. The pain, which was of a severe form, did not usually, as in ordinary cases, subside with discharge of the secretion from the middle ear, but often continued for some time afterward. These cases were unilateral.

As a rule the prognosis was good, no matter how severe the symptoms, and in most cases there was speedy recovery, but in a few the mastoid cells became involved.

He relied upon quinine internally to relieve the neuralgic symptoms, and recommended mild local applications, under which he had observed the quickest recovery. Instillation of warm solutions of boric acid with cocaine, and the occasional use of the Eustachian catheter for relieving the middle ear and the tube of accumulated mucus, constituted the main local treatment.

Dr. Church¹ believes that there was a well-marked variety of influenza, properly denominated "nervous," which was indicated by the almost instantaneous prostration after the onset, the disproportionate asthenia during its course, the severe rachialgia, neuralgia, headache, and sleeplessness, and the subsequent long-persistent neurasthenic state. He believes the infection of influenza had a marked action upon the nervous system, giving rise to immediate acute manifestations, or to remote and persistent conditions; and that in those predisposed to *la grippe* it was competent to cause marked excitement or great depression of the motor, sensory, and mental nervous apparatus.

During the progress of the epidemic we observed frequent cases of this variety of the infection, indicated by pain, nervous prostration, local sweating, convulsions, coma, delirium, and mania. During the prevalence of the epidemic the deaths from nervous diseases were more than double the number returned for similar periods in previous years.

The effects of the disease upon the respiratory mucous membrane, occurring under my observation, did not differ materially in the two epidemics. There appears to have been some difference in the type of pneumonia; that of 1890 being more commonly

of a catarrhal character, or broncho-pneumonia, and that of 1891, more frequently than in the former epidemic, of a croupous character. From my own research I would conclude that during the past winter the tendency to the development of inflammations of the pleura has been much more pronounced than during the preceding winter, and that many cases appeared peculiarly liable to terminate in suppuration. This view differs from the impressions of Dr. William E. Quine, who thought the suppurative process more common in the epidemic of 1890. The first epidemic was characterized prominently by rheumatoid and muscular pains, sometimes followed by articular rheumatism, and the last epidemic more by disturbance of the digestive The epidemic of the past winter has been followed by a widespread outbreak of typhoid fever, which, according to Quine, has rarely if ever been equalled for the season of the year in this or any other section of the country; while in 1890, consecutively to the epidemic or concurrent with it, cerebro-spinal meningitis was extremely common. Dr. J. H. Hollister<sup>2</sup> observed, as a prominent feature of the last epidemic, a form of continued fever running from five to fifteen days, with high temperature, and without intermissions, usually termed typhoid, but differing from it in that the specific ulcers of the glands, and the characteristic stages and symptoms of typhoid fever were absent.

The attack of influenza was usually ushered in by a mild degree of inflammation of the conjunctiva, Schneiderian membrane and the fauces, characterized by lachrymation, profuse watery discharge from the nares, swelling of the turbinated bodies, and more or less congestion of the mucous membrane of the nasal cavities, with more marked congestion and soreness in the fauces. However, the inflammation in any of these localities was usually comparatively slight, much less than ordinarily anticipated in influenza, indeed even less than frequently attends ordinary acute cold. In such cases in the course of thirty-six to forty-eight hours the disease generally progressed to the larynx, where it was characterized by hoarseness and a hacking, annoying cough. After three or four days all evidences of the attack

<sup>&</sup>lt;sup>1</sup> Chicago Medical Recorder, p. 459.

<sup>&</sup>lt;sup>2</sup> Ibid., p. 460.

frequently subsided. This was a most common site of the disease in both epidemics. Next in frequency was one in which the trachea was chiefly involved; indeed, this seemed to me the most frequent of all where the patient was ill enough to consult a physician. The tracheitis was usually preceded by either rhinitis, pharyngitis, or laryngitis, but not infrequently was developed soon after the first symptoms of the attack, particularly without the intervention of inflammation of the upper air-passages. was usually attended with a most persistent tickling sensation in the trachea, which would provoke frequent spasmodic coughs, generally attended, after thirty-six to forty-eight hours, with free expectoration. After four or five days, the sputum became of a thick, muco-purulent character, and often quite offensive to the patient. Such attacks, as a rule, were more protracted than those of the upper portions of the air-tract, and often extended over three or four weeks. Not uncommonly, in these cases, two months elapsed before the cough entirely subsided, and even then, on the occurrence of the slightest cold, the patient frequently complained of the same tickling sensation in the throat, and irritating cough. Simple bronchitis, characterized by frequent spasmodic cough, and more or less profuse expectoration, was observed in a considerable number of cases, usually associated with one or other of the affections already mentioned, but occasionally independent. This, when uncomplicated, was not, as a rule, so obstinate as the tracheitis; however, in some instances convalescence was delayed for several weeks, and in not a few cases the inflammation extended to the capillary bronchial tubes, and true catarrhal pneumonia was developed, which proved a most serious complication, and, in not a few instances, a fatal malady.

The majority of cases of pneumonia growing out of influenza were of the catarrhal variety, but it appeared to me that more were of this type in 1890 than during the past winter, when croupous pneumonia was peculiarly prevalent. In the latter instance, the disease has usually run very much the course of ordinary croupous pneumonia, except that the patient has generally been more prostrated, and convalescence has been longer delayed. Pleuro-pneumonia has also been especially frequent and uncom-

monly disastrous. Cardiac symptoms, as irregularity, intermittence of the pulse, which was usually rapid but occasionally slower than normal, were frequently noted. Dr. Quine¹ had occasionally observed individuals who suffered from influenza in 1890, still presenting a pulse-rate varying from 40 to 60 beats per minute, accompanied by an enfeebled general condition, and with a strong tendency to syncope. Some cases of well-marked angina pectoris were developed during the epidemic, apparently as the result of the influenza. Undoubtedly the cardiac complications frequently resulted from a rheumatism which was associated with the influenza; but most cases were apparently of nervous origin, and in some myo-carditis or fatty degeneration of the organ appeared due to the specific effects of the morbific agent causing the epidemic, independently of rheumatism or other diseases in which the heart is secondarily involved.

Renal affections were frequently observed by Dr. I. N. Danforth<sup>2</sup> as the result of the influenza, which appeared to induce, first, a hyperæmia more constant and intense than provoked by other acute febrile diseases; second, a catarrhal nephritis; and third, a croupous nephritis, as demonstrated by an increased quantity of albumin and the presence of true hyaline casts.

The essential points in the diagnosis of influenza implicating more particularly the respiratory organs, as I observed it, were the sudden accession of fever, with headache and excessive aching of the back and limbs, peculiar prostration, and the symptoms and signs of inflammation of the mucous membrane. It was distinguished from ordinary acute inflammation of the respiratory mucous membrane by the history and physical examination.

Acute follicular tonsillitis often gives almost precisely the same symptoms as influenza; and can only be distinguished from the latter by an examination of the throat. Laryngitis, tracheitis, or bronchitis, due to the epidemic, could only be distinguished by the history, the excessive fever, and by the unusual pain which attended the attack of influenza.

The prognosis of influenza has been considered so favorable that the laity, and even physicians, at first considered it a laughing

<sup>1</sup> Loc. cit.

<sup>&</sup>lt;sup>2</sup> Chicago Medical Recorder, p. 428.

matter; and it is true that the majority of cases recover after a short time, even without medical care; but many cases terminated fatally, especially when occurring in the aged or infirm, and the large mortality from other inflammatory diseases, especially of the respiratory organs and of the gastro-intestinal tract, was undoubtedly largely due to the influenza. In a light attack two or three days were generally sufficient to establish convalescence, and many patients continued their avocations in spite of the discomfort caused by the fever and nervous prostration. Even when the trachea and bronchial tubes were involved, three or four days were usually all that the patient allowed before he considered it necessary to be again about his business. The prostration, however, entailed by the attack usually continued during from one to two or three weeks. Either of the forms of pneumonia growing out of the influenza generally lasted from 50 to 100 per cent, longer than attacks of this disease without the epidemic influence, and the fatal cases were much more numerous. Patients who suffered from pneumonia, and even those who had comparatively mild attacks of tracheitis or bronchitis, were often left in a depressed condition, which rendered them peculiarly prone to the ultimate development of tuberculosis, and pre-existing phthisis was usually greatly aggravated, and its progress accelerated by the influenza.

I think I am perfectly safe in saying that during the past year hardly a week has elapsed that I have not seen some case of phthisis directly attributable to this disease, and serious affections of the heart have not been infrequent.

Our treatment of these cases has not been essentially different from that of inflammatory affections of the same part occurring independently of the epidemic influence. However, careful attention to the nutrition, ferruginous and bitter tonics, especially strychnine, have been demanded more imperatively than in simple inflammation, and ultimately a change of climate has been more often required.

#### THE EPIDEMIOLOGY OF INFLUENZA.

By JOHN C. MUNRO, M.D., BOSTON, MASS.

THE late epidemic of influenza attacked the New England States in the months of December, 1889, and January, 1890. It was preceded in various localities by sporadic or mildly epidemic cases for a period varying from a few weeks to several months. An observer on one of the islands of our coast records a limited epidemic that visited that region in the spring of 1889; and in the following September there occurred a local epidemic in New Brunswick which climatologically may be considered with New England. Scattered records of sporadic cases have been published as occurring one or two months prior to the general epidemic, and many physicians will recall cases which, from the very fact that the symptoms were marked but not in accord with any well-known type of disease, were accurately noted at the time. These cases are of great value in establishing the presence of influenza previous to the great epidemic; indeed, there can be little doubt that influenza was slowly gaining ground for some time before the disease acquired its full force. It rapidly assumed an epidemic form and as rapidly disappeared; but, just as there were premonitions, so there were after-mutterings of the storm continuing for months. During the winter of 1890 and 1891 the disease struggled to assume an epidemic form for a second time, but without marked success.

It is difficult to assign any date as that of its first appearance except in scattered localities where the observations were sufficiently numerous to warrant conclusions. In Boston the disease may be said to have become epidemic on December 19th and 20th; but in other parts of Massachusetts and in the other New England States the date varies considerably, being later in the west and south. In the same way the date of maximum prevalence, being for Boston the week ending January 11th, varies as the date of onset, but perhaps with less latitude. Subsidence rapidly followed

the period of greatest prevalence, lasting, as a general rule, into the month of February. The period of incubation in individual cases averaged four days, at times extending to a week or more. The duration in individual cases—that is, the duration of the acute symptoms—lasted from three to eight days in about 80 per cent. of several thousand reported cases. Complete recovery from the disease, however, frequently did not follow for months.

Patients between the ages of fifteen and fifty were more liable to be attacked than those younger or older, although the latter were by no means exempt, even nursing infants not escaping.

As to the question of sex, it is more difficult to establish any definite rule. In certain localities or certain occupations one sex might be affected to an astonishing degree and the other sex escape without any apparent reason. In those portions of the States where the exposure to the weather would necessarily be most severe, men were as a rule affected in larger proportion than women. Men were evidently more seriously affected because, being the wage-earners, they were obliged to keep about longer than was prudent. In many of the large manufactories it is not surprising to find that the male employés, exposed to sudden changes and to hard work, were almost universally afflicted. Among the well-to-do classes, however, one finds a preponderance of women affected.

The proportion of those attacked to the entire population cannot be determined with anything approaching to accuracy. Most reports published are wild guesses; but, even allowing this to be the case, the estimates are actually no more erratic than the variability in institutions or mills where the inmates were under close and accurate observation and where the conditions of living, work, exposure, poverty, etc. were similar. Why one cotton-mill should have only one employé out of 300 affected, and another mill near by should have from 50 to 75 per cent. affected, it is impossible to say with the data at hand.

The length of time lost by mill-hands was a little less than a week on the average, the aggregate loss in Massachusetts alone in 147 mills amounting to about 265 years. Among the out-door poor in the city the absence from work was much longer, lasting from three to five weeks; but that is perhaps not surprising when

the fact is considered that this class lives in much inferior quarters and has fewer means for medical and hygienic care.

Headache was one of the most constant symptoms, often very severe, beginning early and continuing long after the acute stage, ushered in quite frequently by a chill, and for the most part frontal, in which case the intensity might often be explained by an acute inflammation of the upper nasal and ethmoidal regions. With the headache were associated backache and a general bruised feeling. Delirium, especially frequent in children, apparently depended very little on marked pyrexia. Closely approaching this nervous phenomenon, insomnia as well as mental depression was frequently noted, the two conditions merging one into the other; and it is worthy of notice that the feeble-minded suffered in this respect as well as those mentally sound.

The disturbance of the digestive mucous membrane was more erratic. Nausea and vomiting varied, as symptoms, in different localities; intestinal disturbance, with diarrhea, was common in the northern and eastern portions, while to the south constipation was noticeable. In both classes acute abdominal pains, especially in women, were accompaniments.

Although coryza can be considered as a very constant attendant, it is surprising to see how seldom it was noted as a marked symptom. When present it was of short duration.

Of more significance, on account of its stubbornness and the distress caused thereby, was cough—spasmodic, dry, severe, with but slight expectoration and slow in yielding to drugs. In many, especially the aged and weak, it was truly alarming. Except in cases of typical bronchitis, auscultation revealed very few râles, and when present they were entirely out of proportion to the severity of the symptom.

Nothing can be learned from the temperature-charts except that fever was not noticeably severe in the general run of cases; and, judging from its effect in other diseases, it was entirely inadequate to cause the profound systemic disturbance so frequently observed.

Among other symptoms or accompaniments, but of doubtful value as a means of diagnosis, were the various forms of neuralgia, laryngitis, aphonia, anorexia, etc. Pre-eminent, as a result,

if not a symptom, arising early and continuing to unexplained lengths, was prostration, affecting all ages, all conditions, most annoying to patient and physician, and yielding slowly to any form of treatment.

Conspicuous in the history of the epidemic, especially along the eastern borders of the States, was lobar pneumonia, and whether it was a sequel or an accompaniment, it helped to transform an otherwise moderately severe epidemic into one that proved as fatal as an epidemic of cholera. The deaths from pneumonia were four times as numerous as in the corresponding months of previous years—a much higher rate than that reported from the States lying to the south of us. Moreover, croupous pneumonia was distinctly more commonly reported than that of the catarrhal type, the opposite being the case in the warmer States.

The rate of mortality, however, was not notably increased over previous years, and resolution by lysis rather than by crisis was commonly observed. When occurring during or as a result of the epidemic, pneumonia began in a large percentage of cases within one week after the patient had been attacked by the influenza. Men were subject rather than women in the proportion of three to one.

All cases of pneumonia occurring at this time were, however, not distinctly preceded by influenza. A large number were, probably nearer 75 per cent. than 50 per cent. of all cases; yet, on the other hand, the number of cases that clearly had no connection with the influenza was smaller than during the corresponding period of previous years.

Bronchitis in every form was naturally increased. Phthisis was increased, the influenza acting as direct exciting cause, and the death-rate in those previously affected was much swollen, as would be expected. Cases of otitis were numerous; glandular trouble was rare.

Insanity, awakened undoubtedly in a small proportion of cases, had generally some predisposing history as well. Recovery among these took place in a larger average of cases than usual.

Other epidemic diseases were distinctly less prevalent.

The mortality from influenza pure and simple was small, but the mortality during the epidemic period was alarmingly heavy. In great part we owe this loss to the combined result of a markedly debilitating disease becoming fastened upon patients with resisting powers already lowered by chronic and wasting diseases, and by the great increase of acute pneumonia. Many of the deaths from wasting diseases were in cases that needed only some acute, additional stroke to complete the work that had long been pending. In the period that followed subsidence of the epidemic, the decrease in deaths from such diseases was noticeable, but by no means in an inverse ratio as might be expected.

On comparing the mortality rate of the larger New England cities with that of other cities throughout the Union, it is significant that there was a marked increase in all cities lying to the north of the fortieth degree of latitude.

Locality as regards elevation above the sea-level, a moist or dry soil, or proximity to the sea-coast, had very little to do with the prevalence of the disease. Thickly populated districts suffered more in amount and severity than those sparsely settled. By making a general, broad calculation, although verification is needed, it seems as though the so-called wave started, in Massachusetts at least, from the eastern, urban portion of the State—that is, Boston and its immediate neighborhood—and radiated thence to the north, west, and south, gradually appearing later at the outer ends of the radii. A similar condition was observed independently at various other cities, but what rôle the railroads played in this dissemination depends upon the importance given to the contagiousness of the disease.

During the winter just passed (1890–1891), a very much modified epidemic was repeated, probably of less importance than is generally ascribed to it. In discussing the characteristics of this visit as compared with that of the previous year, practitioners describe a more or less marked difference in the general run of symptoms, but there are no accurate data upon which to base definite conclusions; and when one recollects how varied the individual experiences of physicians were at the time of the great epidemic and how similar that epidemic was to all the great preceding epidemics, the less likelihood is there that there was any marked peculiarity in the smaller epidemic of last winter.

In closing, the writer wishes to acknowledge his indebtedness in particular to Dr. S. W. Abbott's elaborate and able paper published in the Report of the Massachusetts Board of Health for 1889.

### REPORT CONCERNING INFLUENZA AS IT OCCURRED IN ST. LOUIS.

By J. C. MULHALL, M.D., ST. LOUIS.

The conclusions drawn in this short report are based on observations made in private practice in diseases of the respiratory organs.

The epidemic at St. Louis during the winter of 1890-91 was much less severe in type, and attacked fewer individuals than during its first invasion in the preceding winter. Its general features remained the same, except, perhaps, that there were fewer cases of the abdominal and more of the respiratory type.

I saw my last case in the first epidemic in June, 1890, my firs case in the second epidemic in October, 1890, and my last case in June, 1891.

Exact climatic observations are, of course, on record. Crudely speaking, both winters were mild for St. Louis, the winter of the first invasion being, however, the more severe, particularly as regards temperature. In both there was but slight snow-fall, unusual rain-fall, and considerable presence of high winds—features uncommon to St. Louis winters. Judging from my knowledge of the prevalence of the disease over the country at large, it does not seem to one that these unusual winters were of influence in directing the waves of the epidemic toward St. Louis. It seemed to me, especially in the first winter, to have been equally prevalent where the exactly opposite atmospheric factors were present. Zymotic diseases were perhaps more prevalent than in other winters, but not markedly so.

The disease was very prevalent, and seemed not to make much distinction as to social rank. It attacked the weak and the strong alike; those engaged in sedentary and out-door occupations; men

more frequently than women, due, no doubt, to greater atmospheric exposure. It spared neither extreme of life. It did not occur to me, however, to see many cases in the very young or very old. There were very few deaths from the uncomplicated disease at the time of attack; very many deaths within six months or a year from pulmonary phthisis. Inasmuch as the disease seemed, at least to me, to possess the property of rekindling old quiescent pathological processes, the thought occurred to me that the tubercle bacillus was already present in the lungs of those attacked by influenza, who afterwards died of phthisis. That this, as a rule, was not the case, however, was proven by microscopical examinations (undertaken in patients under my control) during or after the preliminary hæmoptysis or pneumonia.

To illustrate what I mean by the suggestion that influenza often rekindled dormant pathological processes, I may mention two or three cases coming under my observation. A lady, aged fortythree, of grand proportions and perfect general health, came under my care in September, 1890, for the treatment of aphonia, due to intra- and subglottic laryngeal papillomata. Though benign, much difficulty was experienced in preventing recurrence; so that she remained in weekly communications for several months. Though many forceps and galvano-caustic operations were made, the wounded tissues always healed most kindly. It was her boast that she had never experienced pelvic difficulty, and she several times expressed wonder at the prevalence of uterine disease amongst her acquaintances. Two weeks after the laryngeal difficulty had been successfully dealt with, she was attacked with the familiar symptoms of influenza, as determined by her family physician, Dr. H. H. Mudd, one of our leading practitioners. On the fourth day symptoms of peritonitis developed, and Dr. Mudd discovered an intra-pelvic tumor. He promptly performed laparotomy and found suppurative peritonitis. This had been caused by the leakage of a pus-sac, which presented evidence of recent disturbance, and also the evidence of having been there during several years, as a post-mortem attended by competent men attested. The rupture had not been caused by cough or other abdominal strain. So robust had been her health that the news of her death created profound surprise.

A gentleman, aged forty, who, to my knowledge, had presented evidences of tuberculosis limited to the left apex for six years, but who, for one year previous to his attack of la grippe during this winter, had maintained his normal weight, had very seldom coughed, and in whom the tubercular process was quiescent (though present, as proven, in August, 1890, by the microscope), came under my care in March, 1891, attacked with influenza. Evidences of active trouble appeared at the left apex, and the microscope exhibited swarms of pneumococci, with an occasional tubercle bacillus. At the end of two weeks the picture was reversed; tubercle bacilli were countless, and pneumococci were but few. Softening and excavations rapidly ensued, and death occurred within six weeks. From these and other cases it seemed to me probable that the materies morbi of influenza often awakened dormant or healing pathological conditions.

There were many deaths in St. Louis from pulmonary phthisis, whose history dated from an attack of influenza within one year. I saw many such cases towards their termination, but also had occasion to see several from beginning to end, and the microscopical story was as follows: Hemorrhage, often containing no proven pathological germ; pneumonia, exhibiting pneumococcus of Fraenkel; and then, sooner or later, the tubercle bacillus.

It seemed to me that one peculiarity of the disease attacking the respiratory organs was intense and unusually prolonged congestion, preliminary to the inflammatory stage. In many cases, indeed, especially in the frontal, maxillary, and auditory sinuses, the disease ran its course with but the feeblest signs of true inflammation. I opened the maxillary sinus twice expecting to find pus, merely from the agonizing pain, but was mistaken. I am aware of three cases where total deafness and terrific pain led the operator to incise the drum membrane to permit the escape of pus, with negative result.

I saw many cases of hæmoptysis, with the signs of intense congestion in a lung, rather than with those of solidification. I have notes of seven such cases, six in men, who were perfectly well before and have since remained well. In all such cases the patient was treated with as much seriousness as if croupous pneumonia were present. Possibly some of these, had they been

allowed to go about, might have developed the train of consequences just described, namely, pneumonic infiltration followed by tuberculosis.

I cannot refrain from mentioning one of the remote effects left by influenza in a number of singers with high soprano voices—namely, a loss of part or the whole of the upper register. This has occurred to three of my patients, and the non-recovery of the singing voice has persisted for 6 months, 14 months, and 19 months respectively. All had mild laryngeal symptoms with the influenzal attack. There are, to-day, no objective signs, barring, perhaps, a muscular hesitation when trying the upper register, easily to be noticed. The apparent paresis has hitherto resisted my efforts at relief.

Epistaxis was a common feature of the rhinitis, and here, as elsewhere, seemed always to be a measure of relief when the mental anxiety of the patient was allayed. It seemed to me that in this very painful disease, as a rule, the pain was out of all proportion to the objective signs. This was well marked in the pharynx and in what I often saw accompanying pharyngitis namely, slight tumefaction of all the cervical glands, so slight that the fingers and not the eye discovered them, and yet exquisitely tender. This tenderness in several cases persisted when every other trace of the disease had disappeared. In several cases of frontal and maxillary sinus involvement, it was necessary to administer morphine boldly; phenacetin and antipyrin were utterly useless. Yet, with such extraordinary pain, with other subjective signs equally severe, it seldom occurred to me to see suppuration. Most of the cases of rhinitis ran their course without the formation of pus. I have, in this month, September, been consulted by two patients with chronic vasomotor coryza, briefly described by the occurrence of an almost constant limpid discharge from a pale mucous membrane, who dated their troubles from the rhinitis of influenza six and nine months before, respectively.

Taking these facts into consideration, one hazards the conjecture that the nervous system plays the highest rôle in the disease; anatomically speaking, vaso-motor paralysis seems to be the initial feature.

The tremendous lassitude, the susceptibility to temperature changes so marked that placing the arms outside the bedclothes rendered the patient too cold, and underneath the covering made him too warm, and the slow convalescence after such slight anatomical changes seemed to point to a poison which acts by paralyzing the nerve-centres.

One attack did not protect. One female patient had five distinct attacks within the two years.

The three types, abdominal, respiratory, and nervous, were well recognized, alone or mixed.

Personally, I found of most service the bed, hot baths, skilful dietetics, phenacetin, and one more drug which seemed to me of vast benefit where the respiratory organs suffered, namely, phenic acid, given as Déclat's syrup of nascent phenic acid, a tablespoonful from three to six times daily.

#### INFLUENZA IN NEW YORK.

By A. A. SMITH, M.D., NEW YORK.

In my remarks I will speak of some of the unusual manifestations of *la grippe* poison, and passing over the cases in which there was a marked similarity of symptoms. The vast majority of cases observed presented symptoms so much alike that the diagnosis was usually made with little difficulty.

The cutaneous system. In speaking of these, reference will be made only to such cases as seemed to have the manifestations from the effects of the disease, and not such as had been taking remedies which might cause them.

An eruption resembling that of scarlet fever, in a few instances even with redness of the fauces, was observed. It lasted only a few days, indeed usually disappearing within two or three days without desquamation and with no sequelæ of such a character as to suggest scarlet fever. These cases were in adults, with one exception, that of a half-grown child. The first two cases observed were diagnosed as scarlet fever, so characteristic, apparently, was the eruption.

Urticaria was observed quite frequently, and in every instance it was in such cases as had the manifestations of the poison most actively in the digestive system.

In two instances I observed an eruption resembling measles, in that it was purple in appearance with white skin between; the spots of eruption were slightly elevated, but had not the feel of the measles eruption. Indeed, it was almost impossible to distinguish it by touch from the surrounding skin.

Purpura was observed in a few instances, but in all the cases it was after the disease had lasted for several days or early in convalescence. It disappeared slowly with the return to health.

Another interesting class of symptoms was observed in connection with the *nervous system*. Great mental depression seemed to be characteristic in a large proportion of cases; in others it was not so common.

Acute mania was occasionally observed. It seemed to have no dependence on high temperature, for in most of the cases in which it was very marked the temperature did not go above 101.5° F. Of course, there were many cases in which there was decided delirium. I confess that it is very difficult under such circumstances to distinguish such symptoms as may be due to a poison of this kind from those which may be due to some complication not discovered; but it seemed to me in observing these cases that the acute mania in many of them was due entirely to the effects of the poison on the nervous system. In these cases the alcoholic habit was not present. In many instances the disease seemed to act as a severe injury does in old alcoholics, as an exciting cause to produce a condition resembling delirium tremens, and very often this was observed in cases in which there was no alcoholic habit.

The suicidal tendency was observed quite frequently, the homicidal very rarely. In a few instances the desire to do injury to others was observed.

Convulsions and various forms of paralysis have been reported, but I have not seen any which I could attribute to influenzal poison alone.

I have the records of a number of cases of marked jaundice as complications of or following the disease. These displayed not simply a slightly jaundiced appearance, but very deep, well-marked jaundice. In all these cases the gastro-intestinal symptoms predominated, and it seemed to be catarrhal jaundice with its usual history.

I have some figures taken from the records of the New York Board of Health. I will promise to try not to bore the Society by reading any large number of figures, but these seemed to me to have a very important bearing upon the subject under discussion. I have taken pains to get the records from the Board of Health for five years corresponding with the months in which influenza prevailed in New York in its greatest severity.

The first case was reported in December, 1889, but the disease

prevailed in its greatest severity in January and February, 1890, and these are the two months selected for comparison. During the second visitation of the epidemic, which was in 1891, April and May were the months taken for comparison, as those were the months of greatest prevalence and highest mortality rates. I have selected three diseases of the respiratory organs—pneumonia, pulmonary tuberculosis, and bronchitis—as representing the diseases most likely to be affected by such epidemic influences. During the years 1887, 1888, and 1889, the three years preceding the development of these epidemic influences, the total number of deaths during the first five months of these three years from pneumonia was 6741 in New York. During the first five months of 1890 and 1891, two years, the total number of deaths from pneumonia was 6210. Observe, only 531 less deaths from pneumonia in the two years the epidemic prevailed than in the first five months of three years preceding.

For 1890 (January and February) the deaths from pneumonia were 3435, which is an increase of 1230 over the same period in 1887, and an increase of 1362 over the same period of 1889.

In April and May, 1891, the number of deaths reported from pneumonia was 3173, which is 262 less than in January and February, 1890; 1037 more than in the same period of April and May, 1887; 1036 more than in the same period of 1888; and 1188 more than in the same period of 1889.

From reports in medical journals, and from listening to the reports of preceding readers, the belief is entertained that the mortality from pulmonary tuberculosis was very much increased during the epidemic. Statistics from the New York Board of Health, however, would seem to show that such is not the fact.

While there was an increase in 1888 of 238 over 1887, yet in 1891 there were only 66 more deaths from pulmonary tuberculosis than in 1887, and 75 less than in 1888, and only 150 more than in 1889.

It was *estimated* by the Registrar of the Board of Health that there were 800,000 persons affected more or less severely, which is about 50 per cent. of the entire population.

As bearing on the question of occupation predisposing to the

disease, 90 per cent. of the police force and letter-carriers in New York were affected; almost all the other 10 per cent. of both forces were occupied in-doors.

### From Annual Report of the New York City Health Department for 1890, and Records for 1891.

Total number of deaths in New York City for the first five months of the last five years by diseases influencing mortality of influenza.

Disease.	Year.	Jan.	Feb.	Mar.	April.	May.	3 years' total.	2 years' total.
Pneumonia	1887	480	370	394	466	390	2100	
	1888	460	505	648	426	409	2448	
	1889	405	394	534	508	352	2193	
	1890	1111	434	487	465	412	_	2909
	1891	502	478	646	1112	563		3301
	Total	2958	2181	2709	2977	2126	6741	6210
•			-	-	===			
Pulmonary tuberculosis	1887	522	438	486	504	437	2387	
Table Total Care Care Care Care Care Care Care Care	1888	412	445	588	520	463	2428	
	1889	445	430	485	426	417	2203	
•	1890	797	512	476	418	422	-	2625
	1891	468	378	521	508	478	-	2353
	Total	2644	2203	2556	2376	2217	7018	4978
D	1005	010	100	900	100	150	931	
Bronchitis	1887	218	168	206	180 181	159 168	967	
	1888 1889	191	217	227 234	159	133	925	
	1890	391	190	229	201	163	940	1174
	1891	174	127	195	333	179		1008
	Total	1156	902	1091	1054	802	2823	2182

Increase in number of deaths during first five months of 1890 and 1891 over same period of 1887, 1888, and 1889.

			Increase.			
Disease.	Total 1	number.	1887.	1888.	1889.	
Pneumonia	1890	2909	809	461	716	
	1891	3301	1201	853	1108	
Phthisis	1890	2625	238	197	422	
	1891	23531	66	752	150	
Bronchitis	1890	1174	243	207	249	
	1891	1008	77	41	83	
Heart diseases	1890	905	17	62	40	
	1891	1036	148	193	171	
Kidney diseases, acute and chronic	1890 1891	1041 1145	28 32	24 <sup>2</sup> 80	$\frac{58^2}{46}$	

Number of deaths from pneumonia, bronchitis, and phthisis during epidemic period of 1890 compared with 1891, and increase of such deaths over same periods of 1887, 1888, and 1889.

	Totals for—		Increase over—			
	1890.	1891.	1887.	1888.	1889.	
January and February .	3435	_	1239	1222	1362	
April and May		3173	1037	1006	1178	

<sup>&</sup>lt;sup>1</sup> Slight increase of deaths from phthisis in 1891.

<sup>&</sup>lt;sup>2</sup> Decrease.

#### INFLUENZA IN SAVANNAH.

By R. J. NUNN, M.D., SAVANNAH.

I have not had an opportunity of hearing the previous reports read. I shall, therefore, simply tell you the history, so far as I can lay it before you in concise language, of this disease as it came before us in Savannah.

In the first epidemic we thought it was simply influenza, and unsuccessfully treated it as ordinary catarrh. Shortly, however, the number of extraordinary symptoms which developed themselves, and which have been so elaborately described, gave strong evidence that it could be nothing like ordinary catarrh, and therefore we looked upon it as a neurosis, and since that time we have been treating it as such—that is, a disease of the central nervous system. It is not necessary to enumerate all the symptoms, because they are legion; we should have to go over almost the whole number, because everything that can come from a disease of the central nervous system will be found in influenza.

Based upon that theory, our treatment was that of stimulation; and of medicines to effect this we found ammonia and nux vomica the most serviceable. Of course the local symptoms had to be treated as they presented themselves; but there was one medicine which, of all others, appeared to act badly with us, and that was opium. In one case I can trace death to the giving of opium, without orders, by an attendant.

The more remote effects of an attack of this kind seem to have been to light up whatever tendency there happened to be in the system; so that, if there were a rheumatoid tendency before, there would be likely to follow an acute attack of rheumatism; if there were lung trouble, there would be a tendency toward disease of the lungs. So with the brain and other organs. So that really the symptoms appeared to be simply the development of the weak points of the patient.

One particular point that was noticeable was tardy recovery. Patients recovered but slowly, and to-day there are patients who, having suffered from an attack of influenza in the first epidemic, are still suffering from the effects. These we found were best aided by a change of climate, and we have been in the habit at Savannah of sending our patients to adjacent springs, where they recuperate.

There is one other remedy which I forgot to mention, and which we use with success; that is, hydrastis Canadensis.

3

# DISCUSSION UPON THE REPORTS OF THE EPIDEMICS OF INFLUENZA OCCUR-RING IN 1890-'91.

Dr. James J. Levick. I have been very much interested in the able papers which we have heard read this morning.

Very soon after I began the practice of medicine, between 30 and 40 years ago, there occurred in Philadelphia an epidemic of influenza. It was a subject which then interested me very much, and I gave it my careful attention and later wrote a paper on Influenza, which was printed in the American Journal of the Medical Sciences for January, 1864. I may say—without vanity, perhaps, at my time of life—that it has been extremely gratifying to me to-day to find that I used the same language when writing of the epidemic at that time that has been spoken among us this morning; all, indeed, confirming the statement made by Dr. Theophilus Thompson, in the Annals of Influenza, printed by the Sydenham Society nearly half a century ago. In 1852 Dr. Thompson said:—

"Nothing can more forcibly prove the definite character of the influence which produces this disease than the similarity of the symptoms during several centuries and under such different degrees of civilization. We find the affection, in our comparatively luxurious days, manifesting the same phenomena as it exhibited when the presence-chamber of sovereigns was strewed with straw, the entrance of aristocratic mansions obstructed with decaying vegetable matter, and a lantern required at night to guide the wary steps of the citizen through the 'slabby streets' of the metropolis."

In my paper, which I have before me in a reprint, I mention, among other existing symptoms, insomnia and occasionally a delirium resembling mania a potu. This paper was prepared so long ago that the observations made to-day are entirely inde-

pendent of it, and yet you have all heard the interesting statement by Dr. Smith in regard to cases of delirium in influenza resembling mania a potu. He spoke also of jaundice. I have here recorded a case where the color of the skin was so yellow as to resemble the skin in yellow fever.

I am, however, still more interested in the occurrence, in the late epidemic, of the same *anomalous* symptoms as were recorded in 1861 and 1863, thus:—

"The occasional occurrence of cutaneous eruptions was observed in several cases of influenza during the present year. In one or two instances the exanthem covered the whole body. Viewed at a distance, it was not unlike the eruption of measles."

And so long ago as 1782 Dr. Carmichael Smyth says:-

"Some had erysipelatous patches, or efflorescences, on different parts of the body, which, in one instance, terminated in gangrene."

I merely call attention to these extracts to show that no new thing has happened in our late epidemic.

Dr. Curtin¹ spoke of meningeal disease as a frequent cause of death in the epidemic in Australia. Another gentleman spoke of purpura, and another mentioned vaso-motor paralysis. All this leads me to what has been a subject of interest to me for the last thirty years in connection with this disease, and to which I wish briefly to call the attention of the Association to-day. What I refer to now is a close relationship which I believe exists between epidemic catarrhal fever or influenza and epidemic cerebro-spinal fever or epidemic cerebro-spinal meningitis.

It fell to my lot in 1864 to write for the American Medical Association the report on "Spotted Fever, so called," or Cerebrospinal fever. I there said:—

"When the attention of the profession in Philadelphia was called to the existence of spotted fever there was prevailing in that city a severe and widespread epidemic of influenza or epidemic catarrhal fever. In some instances this presented the phenomena of pulmonary or bronchial irritation, which, though not an essential, is a frequent accompaniment of influenza; in others, these were wanting.

<sup>&</sup>lt;sup>1</sup> The Climatologist, March 15, 1892, p. 82.

"I was at once struck with the resemblance of many of the symptoms of the two diseases, and was led to inquire if influenza might not be but a milder manifestation of that epidemic influence which in its intensity produced spotted fever. Nor, it will be seen, were their symptoms very dissimilar save in degree. Suddenness of attack, intense pain in the head and back, great nervous depression associated with marked cutaneous hyperæsthesia, great præcordial distress, nausea, and vomiting were common to the two diseases. So, too, were certain incidental phenomena, such as the occurrence of irregular forms of cutaneous eruptions, roseola and urticaria, occasional glandular swellings, and rheumatoid affections of the joints. This notion of a resemblance, though favored by some, was ridiculed by others, and the subject does not seem to have excited much debate. I do not propose to reopen this subject more than to call the attention of the Association to the interesting fact of the almost uniform coincident prevalence of spotted and of catarrhal fevers.

"Such was the case in the epidemic reported by Dr. Gallup, who regarded the 'two diseases as in no way differing but in degree and seat of their urgent symptoms.' A contemporary writer, Dr. Trent, calls spotted fever malignant influenza. Dr. North says that the two diseases prevail together. The most earnest advocate at that day of the close relation of these fevers was Dr. Job Wilson, who, in a work on spotted fever before quoted (published in Boston, 1815), uses the following words: 'The similarity of the influenza to spotted fever is so striking that. had it not been for the occasional occurrence of spots, it is probable that the present epidemic might have continued to be called by that name.' 'Believing, then,' as he expresses it, 'that influenza and spotted fever correspond in all their most important symptoms, . . . differing only in degree,' he proposes the following classification: when the disease exists with simple inflammation of the air-passages, i. e., our ordinary influenza, he calls it febris catarrhalis; when with pleurisy or pneumonia, febris catarrhalis synocha major; while to the third and most severe manifestation of disease he gives the name of febris catarrhalis maxima or spotted fever."

I do not ask this Association to adopt or receive this relation-

ship as an established fact. All I ask is for you to bear the subject in mind while carefully watching the cases of influenza which may come under your care next winter.

Dr. Charles E. Hackley, well knowing my views in regard to this matter, has kindly sent me a little slip cut from one of the professional journals, with the reading of which I shall close my desultory remarks:—

"The Spinal Cord in Influenza.—At a meeting of the Royal Academy of Medicine of Turin, on May 23d, Professor P. Foá described the lesions which he had found in the spinal cord of a woman who had died of influenza. The patient, who was of 'middle age,' had suffered from the usual symptoms, and the attack was followed by extremely acute bronchial catarrh, and later on by broncho-pneumonia on one side, with hepatization of the other lung. Sections of the spinal cord showed intense hyperemia, its substance being dotted with minute red points. On microscopic examination, numerous hemorrhagic foci were seen in all the divisions of the cord, notably in the upper twothirds of the dorsal and the upper portion of the cervical region. There was recent infiltration of red corpuscles among the nervous elements, which were slightly separated and compressed, but not visibly altered in structure. Some of the vessels were obliterated, and it was in the neighborhood of these that the hemorrhages had taken place. Degenerative changes were also present in places; the axis-cylinders being hypertrophied to five or six times their ordinary size, and the nerve-fibres degenerated. These degenerative foci were, as a rule, independent of the hemorrhagic patches, but in the highest part of the cord the two lesions were sometimes found together. The hemorrhagic foci were chiefly situated in the posterior columns, almost always at their periphery; the degenerative foci occurred mostly in the lateral columns. Neither the gray matter nor the posterior roots showed the least alteration. Dr. Foá thinks that the lesions were due to occlusion of vessels, giving rise in some places to hemorrhage, and in others to alterations in the nutrition of the nerve-fibres. thinks it probable that the occlusion was caused by an accumulation of micro-organisms, but admits that he was unable to

verify this conjecture. Examination of the brain was not permitted.

Before I close, may I say one word about the treatment of influenza, much as I wrote it thirty years ago? I read from a footnote to a reprint of my paper before referred to:—

"In this epidemic (1889-90) much the same treatment has been found satisfactory. In the early febrile stage the natural mixture (liq. potass. citrat. U.S.P.) with a drop or two (not more) of tincture of aconite root every three hours was given with advantage. To promote sleep a teaspoonful of paregoric (tinct. opii camphorat.), with one of sweet spirit of nitre, repeated if necessary in the night, was often all that was needed. Where the cough was more persistent, a mixture containing in each dose gr. 16 of acetate of morphia with syrup of orange and water was given; to which, in some instances, muriate of ammonia was added. Quinia in divided doses up to twelve or fifteen grains was given early, and later in small doses as a tonic. In a few instances, antipyrin in five-grain doses, repeated but a few times, was given with advantage where intense pain in the head or elsewhere existed; but, as a rule, antipyrin and all its depressing relatives of the coal-tar family, if used at all, were used with extreme caution. So too with digitalis, the injudicious use of which may readily destroy a feeble patient's life. The disease is a self-limiting one, with a tendency to recovery; and that treatment will be most efficient which is most simple and which carefully avoids any drug that will further depress the already lowered tone of the system. For the wretched weakness left after the acute symptoms have subsided, some forms of malt for men, ale or beer; and Tokay wine for women-were found very helpful. A change of air, to the seaside, for instance, rapidly promoted convalescence."

Dr. Samuel B. Ward. It is entirely probable that this disease is due to the presence of some germ; at any rate, any one would find it difficult to prove the reverse. This germ, if it be present, acts in many respects, to my thinking, in a manner entirely similar to most other germs of which we have cognizance. We must constantly bear in mind that for the produc-

tion and propagation of this disease it is just as necessary that we have a proper soil for the growth of the germ as it is to have the germ itself; and as a result, if we are to take preventive measures, it is probable that advances will be made more in the direction of putting the soil in a condition unfavorable to the growth of the germ than in the direction of new germicides.

No doubt many of us furnish no proper pabulum for the growth of this germ, so many of us escape it entirely.

In the second place, this germ shows the same selective disposition in its location for propagation and growth as is exercised by those germs that infect the skin and intestines—that is, primarily in the nervous system. It differs from some other germs in that one attack gives no immunity from others. Patients frequently have had two or three, and even five, attacks, as was stated this morning.

It has been repeatedly said that this germ seems to exercise an influence in the direction of lighting up other inflammatory affections. We have all noted of course that subjects of phthisis were especially likely to prove fatal cases. It seems to me, however, that here is another illustration, not of the fact that this germ did light up old inflammations, but that it simply reduced the resisting power of the system. That is the point I wish to make—that it seems to me that the germ does not light up old inflammatory infections, but that at the seat of old inflammatory affections, whether phthisical or other, this germ diminishes the power to resist invasion or to effect repair.

Dr. A. A. Smith. I would like to hear an expression of views from those who have not committed themselves as to the contagiousness of this disease. Dr. Curtin has quite emphatically informed us that in his opinion it is decidedly contagious. It seems to me that, if contagious at all, it is so only to a very slight degree.

Dr. Willis E. Ford. On the question of contagiousness, those who have been practising in the Mohawk Valley, in the State of New York, have witnessed two epidemics very similar in all respects as to the catarrhal symptoms, but quite different

as to the nervous symptoms usually following epidemics. In the first epidemic, two years ago, there was more muscular disturbance of the heart, and during this last year there was observed in many cases a higher temperature, and at the same time more nervous disturbance following the attack than in the year previous.

The contagiousness of the disease was discussed in a local society some time early in May, and the observers there agreed pretty generally that there was not sufficient proof of it. There was an impression in the minds of many men, from observation of isolated cases, that there was an element of contagiousness, and yet no one was able to submit proof that seemed to us to be at all weighty. It is my impression that it is not contagious at all.

Dr. John H. Musser. I am in accord with my friend Dr. Curtin as to the contagiousness of the disease, not necessarily that it is actively so. We have further proofs of its contagiousness in the experience of Dr. Trudeau, who was able, I believe, by quarantine measures at his sanitarium, on the Saranac Lake in the Adirondack region, to absolutely prevent the inmates acquiring the disease.

Dr. Karl von Ruck. In regard to the contagiousness of the disease, I am able to give some of our experience in Asheville in 1890.

The disease seemed to have been quite prevalent in the vicinity for some five or six weeks, and finally began to manifest itself at our sanitarium among those servants who had outside communications; next it appeared in the kitchen, then among the waiters in the dining-room; but still none of our guests were affected. Subsequently, out of some thirty or forty patients in the house, only three contracted the disease in a mild form, while out of perhaps thirty healthy people, mostly employés, more than half came down in one week, evidently contracting the disease from one another.

Dr. S. A. Fisk. I do not know that I can add anything to the general experience, with reference to influenza, as it prevailed throughout the country; but there is one thing that struck me, practising as I do in Colorado, and that was the way it appeared in isolated cases, on ranches, entirely separated from the general communities. Cases would come to me of persons living on ranches many miles from any railroad station, persons who had not come in contact with people from the general communities; thus showing the general epidemic character.

The nervous influence of the disease was very marked in Denver, producing in many cases such nervous prostration as to render recovery slow, as was illustrated in the case of two physicians, well known in our city, who have not even yet fully recovered from the nervous effects of the disease.

We had a second epidemic of the disease last winter, which seemed to differ very decidedly from the first, not being nearly so severe as the attack we had a year and a half ago; and, in the second place, it differed from that; in the first attack, in addition to the nervous systems, pulmonary symptoms developed, while, in the second attack, the intestinal symptoms seemed to be more marked.

The influence of the influenza upon our consumptive cases was an interesting study, and I think the general observation was that the consumptive invalids were quite exempt from the disease I saw a very few cases of it in persons who had pulmonary phthisis, and where it did occur I think the attack was rather light; I cannot now recall any fatal case in that class.

Another point I had occasion to consider was the influence of influenza in the production of pulmonary troubles. In looking over my notes, I found that most of the cases that have of late come to me from the East were persons who dated the commencement of their pulmonary trouble from an attack of this epidemic affection.

Dr. Andrew H. Smith. I have not heard much of the preceding discussion, and therefore, to avoid the chance of repetition, I shall not make any very extended remarks. My experience with influenza in 1890 and 1891 was entirely in my private practice, the period having fallen outside of the time of my hospital service. Therefore, my number of cases may not have been so large as that of other physicians. I will simply say a few words in

regard to treatment, as the other grounds have been gone over to a considerable extent, and will say something in defence of phenacetin, which has been spoken of somewhat disparagingly. I used it largely in my practice, but I guarded its influence by combining it with camphor and atropia.

I had tablets made containing  $3\frac{1}{2}$  grains of phenacetin with  $\frac{1}{2}$  grain of camphor and  $\frac{1}{200}$  grain of atropine sulphate. These tablets did not seem to decrease the action of the heart so much as phenacetin alone, and the patients were exempt from liability to the profuse perspiration which phenacetin sometimes excites. I used this combination frequently during the last epidemic (1891), not the previous one, and it rarely failed in my hands to procure relief from both the high temperature and the muscular pains. I was in the habit of following it up with pretty free doses of quinine. This line of treatment gave me very excellent results. Of quite a large number of cases I had none which was complicated with pneumonia. I had no fatal case among my own, though some cases in which I was consulted terminated fatally.

The succeeding prostration in many cases was very great, but no fatal complications occurred.

I noticed a number of cases last year of what Dr. Ingals mentioned, that peculiar irritating cough, sometimes the most obstinate and disagreeable feature in the case, and the most difficult to control, and almost the only thing that forced me to the use of opium. It seemed in many cases as if nothing but an opiate would suffice. In those cases I found codeine of great use. A general tonic regimen afterwards was found to be of great service, and for the most part a simple treatment, as has been stated here to-day, seemed to be the most successful.

I am asked to give my experience as to the contagiousness of the disease. I have really not been able to make up my mind definitely on that point. Very frequently I saw an isolated case in a family, and sometimes I saw several cases in a family; so that I was at a loss to determine whether there was direct contagion (transmission from one person to another), or whether it was due to some general atmospheric cause. My conviction, however,

is that it is a germ-disease. It seems to me that the entire history of these two epidemics points in that direction.

Dr. James J. Levick. I should like to hear a larger expression in regard to this question of contagiousness. I have not been able to make up my own mind on the subject, and I desire information. Of course, where a disease is epidemic, it is extremely difficult to determine whether different members of the same family have taken the disease one from another or not.

DR. CARL RUEDI. In Switzerland we have had two attacks of influenza, and in the first attack we bad a sure proof, as I think, of its contagiousness. Four men lived on the great St. Bernard; they were snowed up for the whole of the winter; they were attending to their cattle, and had no communication whatever with the people in the valley. In the valley influenza raged. In February or March, when the snow on the surface began to melt and freeze, one of the men went down into the valley, I think to attend church. He was there about four or five hours, where the people were ill with influenza, before he marched back again about twelve miles. Three days afterwards he had influenza, and shortly afterwards, when he was recovering, the other men who were with him were attacked by it. All four men had the disease quite as if they had lived in the valley. How could the disease have got there except by reason of the first man having gone down into the valley where it was raging? No other person during the whole course of the winter had had any communication with the valley. From the end of October to the beginning of June it is not possible for travellers to go through that pass.

Dr. W. W. Johnston. It seems to me that the two questions are: first, is epidemic influenza contagious? and, second, does it spread by contagion?

I have no doubt that the epidemic, as we saw it, was not propagated by contagion. We remember very well a similar epidemic among horses, and in what a short time an enormous number of the animals were attacked. It was the same with this disease.

I remember distinctly the first case I saw. Not expecting it, and hardly believing in its appearance in Washington, I did not recognize the true nature of the illness; but within four days so large a number of cases appeared, and the development of the disease was so rapid, that to my mind the disease must have been propagated in some other way than by contact. I think that personal contact of individuals cannot explain the rapid involvement and spread of so large a number of cases in so short a time.

My experience does not accord with the opinion stated here, I think by Dr. Curtin, as to the relief produced by hemorrhages. I witnessed some cases of intestinal hemorrhage, and another case of hemorrhage from the nose, so severe that it was necessary to plug the nostrils, and even then it was difficult to control.

I think one gentleman who read a paper stated that the disease was very rare among children. I am not sure that I report him correctly. My own experience is that among children the disease was not at all uncommon. It was even seen in infants with the same nervous exhaustion found in adults.

DR. W. C. VAN BIBBER. As to the contagiousness of the disease, I may state that an institution about sixteen miles from Baltimore, the well-known St. Charles College, which has a population of about 200 persons and is far removed from any other house, had this experience: One young man caught influenza, it is supposed, in Baltimore, and within four or five days there were more than eighty persons in the institution in bed with the disease. It certainly spread throughout the house with wonderful rapidity. I am not in a position to make further comment upon this remarkable fact.

As regards treatment, I have used narceine, and have found it exceedingly useful given in small quantities. It controls the disease better than any medicine that I know. I give it in doses of one-third of a grain at night, with one grain each of saccharum album and saccharum lactis, which neutralize the bitter taste of the narceine, and make it rather agreeable. I give it for three successive nights, advising it to be taken after getting warm in the bed, and to use some additional covering so as to increase the cutaneous transpiration.

Dr. Frank Fremont-Smith. During winter before last Florida escaped with a very mild attack, so mild that in St. Augustine it was difficult to tell whether the disease existed or not. There was only one well-defined case, and that was a brother physician. The whole state seemed to escape with little contamination.

Last winter, however, early in October the epidemic broke out still in a mild form, and continued among the native people until the first of February. I was not in St. Augustine until the 21st of January, but I saw 25 or 26 cases between that time and the 10th of February. From the first of February until the end of March, even while the Northern people were with us, we did not have influenza, though it is true we had an unusual amount of sickness. As the disease appeared among the natives during those early months it was free from complications, and I did not hear of or see a case in which there were any other symptoms than catarrhal; there were no abdominal or nervous symptoms involving great pain which were not controllable without morphine. The disease would run its course usually in from two to four days, and the fever had many of the indications of "break-bone" fever, and was often thought by the natives to be that affection.

Dr. Andrew H. Smith. It seems to me that while the germs were diffused widely in the atmosphere they were especially abundant in the vicinity of sickness; that while there was enough germ material nearly everywhere to account for apparently sporadic cases here and there, the germs were very much more concentrated in the vicinity of those affected by the disease, and therefore the spreading from one to another would be more apt to occur.

Dr. R. G. Curtin. In regard to contagiousness, Dr. J. M. DaCosta is responsible, I think, for the report of a case at the time of the epidemic spoken of by Dr. Levick. The disease was not present at that time on this side of the Atlantic. An American was abroad where the epidemic existed, and died as a result of influenza. His body was brought to this country in a casket, which was opened after it reached his home. Every person pre-

sent, when the casket was opened, was seized within a few days with influenza, none others being affected until later. I think that the case shows very strongly that the disease is contagious.

One gentleman spoke about angina pectoris. I think that, within the last six months, I have seen more angina pectoris pains than during the four years preceding. I have seen at least eight cases within the six months, showing that it is more prevalent than usual.

In regard to phthisis following this disease: Not quite a year ago, during the excitement about "Koch's lymph," I prepared some 48 cases of phthisis in the Philadelphia Hospital for the use of this material. Out of that number I think there were 28 cases that dated back to an attack of influenza, which was considered as the original cause; and out of the 28, 12 were entirely free from evidences of bacilli in the sputum, as shown by a microscopical examination. This proves that the bacilli were not factors in the original production of the phthisis which followed the influenza.

As to treatment: I wrote a paper last spring for the Philadelphia Hospital Reports, in which I made mention of the fact that oil of sandal-wood, given upon a lump of sugar, was often successful in allaying the explosive cough in influenza. I discovered the remedy accidentally, giving it to a man suffering with gonorrhea with a troublesome cough. The result was so magical that I afterwards used it quite extensively, and embodied my experience in a paper in the Philadelphia Hospital Reports (vol. i.). I found that in the great majority of cases the oil of sandal-wood almost immediately relieves the cough.

Dr. Albert L. Gihon. The practitioners having been heard, I may be permitted to speak from the standpoint of the patient, having been a victim of the influenza in February, 1890. I was living on a government reservation where there were some 200 people. In that reservation there were not more than four or five cases, and none so bad as my own. My prominent symptoms were profound mental despondency, long-continued, with great physical weakness, hyperæsthesia of the surface, rheumatoid pains, and spinal tenderness. The symptoms described by Dr. Levick in his report of 1861, which he has just read, were my

own largely. The additional characteristic of my attack was protracted or very retarded convalescence, and I believe that is about all there is of it—mental despondency, physical depression, hyperesthesia, rheumatoid pains, spinal tenderness, and tediously protracted convalescence.

Dr. J. C. Mulhall. One gentleman spoke of hemorrhages in connection with the disease. I stated in my report that they seemed to afford relief. I did not come in contact with hemorrhages violent enough to debilitate. They were slight, and certainly afforded relief.

I have never been able to make up my mind as to the contagiousness of the disease.

## THE VALUE OF KOCH'S REMEDY EMPLOYED AS AN ALTERATIVE — REACTIVE FEVER PREVENTED.

#### BY FRANK FREMONT SMITH, M.D.,

ST. AUGUSTINE.

The results of study of pulmonary tuberculosis in all stages under prolonged treatment with tuberculin lead me to state the following conclusions:—

- 1. The dose of tuberculin is a widely varying quantity, to be determined, with its rate of increase for each case, only by direct experiment.
- 2. The only therapeutic dose is such a quantity as arouses no reactive temperature, every reactive fever being the expression of an overdose, *i. e.*, a poisonous dose.
- 3. Tuberculin, when successful by fever reactive method, is so despite, not by virtue of, reactions.
- 4. Tuberculin by non-reactive method acts as a powerful upbuilding alterative to the tuberculous subject.
- 5. Cases in all stages of tuberculosis may be treated by the non-reactive method without danger.

Observation of numerous cases in Berlin and especially a study of those in the wards of Leyden, Charité, to which free access was granted me at all hours, led me to conclude: First, that some cases when treated with tuberculin, though in proportion few, made a definite and continued improvement in general physical conditions, in character of cough, and amount of expectoration; second, that weak men and nearly all women progressed unfavorably.

Those cases which ultimately gained, lost weight during the first week or two weeks of treatment. Such cases were usually men of great native vigor. Of women, who are especially susceptible, tuberculin induced fever—among fifty cases but one was improving in the wards of Senator. Nearly the whole number

were rapidly fading away, their reactive fevers tending to become continuous as treatment progressed. At Friedrichshain the one hundred charts examined showed that no women with pulmonary forms were improving. Similar results were obtained in the wards of Gerhardt and Von Bergmann, and at Moabit Hospital the successful cases shown were men. Among all these cases earlier stages of the disease were numerically well represented, but the induced fevers were exhausting and ruinous to all alike.

Of the disturbing or dangerous effects upon the local lesion I spoke in my Berlin communication to the *Medical Record* of January 3.

Although small doses have been mentioned by various writers, they have been employed with the full purpose of obtaining fever reactions, and have been increased until these were achieved.

American observers who have been unsuccessful, and have discontinued the treatment, have invariably stated that characteristic reactions were obtained.

The entire absence of uniformity in results with incipient cases in the hands of all operators, and the uncertainty manifested by all as to the class among incipient cases in which success might be expected, suggested a possible error—not in the constitution of the remedy, but in its method of administration, which hitherto has not been adapted to obtain the fullest therapeutic effects with the least expenditure of energy.

To produce every second day the ultra-physiological action of tuberculin, as exhibited in fever reactions, disturbs the general equilibrium and disarranges nervous, digestive, and secretory functions upon whose very quietude and uninterrupted activity substantial improvement is of necessity based. To employ any medicinal agent on a plan so irrational as that on which Koch's lymph has been used would condemn our most powerful and valuable drugs, and, as in the case of tuberculin, soon discourage both patient and physician.

Since the proportion of improved cases in foreign and American hospitals was too small, the risks of the venture under the usual methods too great, I determined at the commencement of experiments at Alicia Hospital, St. Augustine, on January 27, to adopt a plan not, as far as I am aware, until the present time suggested

as a principle by any observer—namely, to maintain the doses uniformly below the fever-reaction line, proposing to employ such increasing dosage as may be borne by each individual without fever, pain, mental depression, loss of appetite, and wasting of flesh; thus, perhaps, to escape renewed congestions in the region of diseased lung areas, and especially to retain general conditions for the patient as favorable at least as previous to treatment.

Results of this plan are shown in the following notes of all cases treated at Alicia Hospital, taken from the records of this institution:—

Incipient and advanced cases have been treated. I have endeavored in every instance, although gradually increasing the dose, to retain normal temperature. Women and delicate men in any stage are especially susceptible to tuberculin fever; hence the dose has been adapted to their condition. Individuals in apparently the same stage and physical state vary greatly in their resistance to induced fevers.

The decided influence which this remedy has exerted in my hands under the gentle, steady pressure of non-reactive doses has been analogous to that of the iodides—an alterative of well-established power.

Incipient cases :-

1. Falkner, age 33, residence Georgia; one brother and one sister died of tuberculosis; failing for the past six months; on entrance, feeble strength, poor appetite, harassing cough day and night; evening temperature, 99.6° to 100° F.; sputum, four ounces daily; bacilli numerous; infiltration of left apex down to third rib; moist râles; in right apex, slight supra-clavicular dullness. First inoculation, January 27, one-half milligramme; reactive fevers avoided until the twenty-ninth injection, dose forty-five milligrammes, unexpectedly produced a temperature of 101.2° F. The dose was now modified and again gradually increased without reactions until, on April 24, eighty-five milligrammes were administered. Examination on April 23 showed: "Dullness persists; râles are absent; cough slight, none during the night; sputum, one to three drachms daily; normal weight,

160 pounds; entrance weight, 136 pounds; weight on April 23, 153 pounds; gain, 17 pounds."

- 2. Taunton, age 23, residence in Florida six years; mother and one brother, 21 years of age, died of tuberculosis; coughed for one year; hæmoptysis in January last; unable to work during the past seven months; evening temperature on entrance varying from 99.4° to 100.4° F.; night-sweats; area, bounded by second and seventh ribs upon the right side, presents dullness, bronchial breathing, moist râles, bacilli in moderate numbers. First inoculation, upon February 17, one milligramme; during the first eighteen days of treatment the maximum temperature was 99.6° F. For the following fifty-three days the temperature reached 99° but five times, its maximum then being 99.3°. Final dose, upon April 24, sixty milligrammes. Thirty-three treatments were administered. The sputum on entrance amounted to one ounce daily; after April 9 it never exceeded four drachms. Weight on February 17, 144 pounds; on April 23, 164 pounds. Râles lessened, otherwise the physical conditions were unchanged. Cod-liver oil, which had been taken for months previously, was continued. Reported by Miss A. Smith, hospital superintendent, June 24, "improved after your departure; left hospital in May feeling well; gain, 20 pounds." June 1, 1892. Dullness remains. Coughs rarely. Expectorates little. Has done carpenters' work in Florida for eleven months.
- 3. Mrs. Cantwell, age 41, residence Florida; only sister died of tuberculosis, which exists on father's and mother's side. Cough began early in October, 1890; dullness on the right side down to the fourth rib; bronchial breathing and râles; left side, slight dullness, supra-clavicular bronchial breathing; bacilli in moderate numbers; during ten days of observation before inoculations began, evening temperature ranged between 99.5° and 100.2° F. During these ten days her weight fell from 127½ to 125 pounds. Sputum, one-half to one ounce daily. First inoculation, on February 23, one-half milligramme; reactive fever, 104.5°. Forty-eight hours later her weight had fallen to 123 pounds. Treatment was discontinued for five days, then one-half milligramme repeated. Maximum temperature, 99.2°. From February 25 until March 4, reactions avoided; patient gained to 125¾ pounds.

Sixth dose, one and one-half milligrammes; reaction, 102.4°. Eighth dose, two milligrammes; reaction, 102°. Reactions were successfully avoided during the subsequent treatments ending April 24. Final dose, eight milligrammes. Sputum ranged from one-half to one drachm during the last fifty-one days of treatment. On April 24, râles absent, dullness and bronchial breathing continue; weight, 130 pounds (normal weight, 135 pounds to 140 pounds). No medicine had been administered. Patient was called home by illness of her mother at end of April. The report on June 14 states: "I now weigh 135 pounds and am feeling stronger every day; seldom cough, sleep well, feel and look like myself, and am just making up my mind that the lymph has probably cured me." Gain, 12 pounds. June 1, 1892. Retains weight. Physical conditions normal. Cough and expectoration altogether disappeared. Has kept hotel and done newspaper work all winter. Perfectly well.

4. Mrs. Johnson, mulatto, age 28, residence Brunswick, Georgia. Her brother and all members of her father's family died of tuberculosis. Cough and failure of strength commenced July, 1890; since that time has lost 25 pounds in weight. On the right side there was dullness, bronchial breathing, with moderate soft râles down to the sixth rib; and dullness down to the third rib on the left side. Her evening temperature 99.2° F. Daily quantity of sputum ten drachms; bacilli present. Her first treatment was received on March 13, one-half milligramme being administered. During March the maximum temperature exceeded 99.2° but once, then reaching 100° F. On April 3 and 5, following injections of two and one-half milligrammes, her temperature rose to 101.1°. Treatment was then discontinued for five days. The patient suffered from lassitude, loss of appetite, and great depression. The treatment was resumed with no further indications of reaction until April 19, when the temperature rose to 101°. The final dose was administered on April 27, consisting of five and one-half milligrammes. Seventeen treatments were administered in all. Her weight on entrance was  $112\frac{1}{4}$  pounds; on April 28,  $122\frac{1}{2}$  pounds—gain,  $10\frac{1}{4}$ pounds. Night cough was somewhat lessened; quantity of sputum remained the same; physical condition was unchanged, excepting some diminution of râles. The report June 24 reads: "Called home when she was doing well; a letter from her a few days ago says she is failing rapidly." Died in a few weeks.

- 5. Mr. German, aged 31 years, residence in Florida for past six years. Father died of tuberculosis. He had an empyema that was opened in May, 1890, six pints of pus being removed, with continuous discharge since. At present this amounts to two ounces daily, and is laden with bacilli. He is subject to frequent fevers; appetite poor; greatly emaciated; scarcely able to walk. His first inoculation was made February 8. Upon February 18, the patient reports that he has a good appetite for the first time in years. The treatment was continued without reaction until the 14th. On March 29, four milligrammes aroused a temperature of 103° F. Patient was greatly prostrated. The dose was reduced to two milligrammes, and no further reactive fever occurred. The dose on April 22 was eight milligrammes. After twenty-six treatments, the discharge was reduced to one ounce. His normal weight was 165 pounds; weight on entrance 1263 pounds; on April 22 it was 130 pounds. He reported on July 7, from Albany, N. Y., that his weight was 130; that he discharged 1½ ounces daily; and that he continued to gain in strength. He improved until September 5, when he died suddenly from uncontrollable hemorrhage from his wound in the chest.
- 6. Mrs. Ducellier, 42 years of age, residence in Florida for past four months. One brother died of tuberculosis, that followed influenza in January, 1890. She has lost 19 pounds in weight during the past three months. There was dullness and bronchial breathing at right apex. She had evening fevers and night-sweats. The beginning dose, on March 18, was one-fourth milligramme; her final dose, on April 23, was six and one-half milligrammes. There were no reactive fevers, but her expectoration diminished in quantity one-third. Her weight, on March 18, was 115\frac{3}{4} pounds. On April 23 it was 118\frac{3}{4} pounds. The report of June 24 states: "Mrs. Ducellier gained after you left; she is now keeping house and feeling well." June 1, 1892. Despite wretched domestic life and sufferings has done well. Expectorates little. Disease never

advanced further; now steadily going after separation from husband.

In the incipient cases, physical signs and microscopic examination established the diagnosis. The results may be attributed to tuberculin alone, since no other medicines than those mentioned were administered, and the patients were not subjected to climatic changes, excepting as noted. All patients had lived in fair circumstances, and, previous to treatment, good food had not been wanting; but, until the inoculations were begun, both appetite and power of assimilation continued greatly impaired. In all but one, improvement has progressed in the two months subsequent to discontinuance of treatment, and this one, a mulatto, being of the mixed race, which, it is well known, does not long survive the ravages of tuberculosis, offered gratifying improvement. The immediate decline on discontinuance of the treatment suggests that it had been a powerful support. In all cases râles diminished; other physical signs remained not appreciably changed. Evening temperatures exceeding 101° have contraindicated immediate treatment.

Advanced Cases.—Dowd, 23 years of age, residence in Florida 17 years. His half-sister died of tuberculosis. Since 12th year of age has had occasional pleurisies. On entrance, the sputum amounted to six to seven drachms daily, with bacilli abundant. His evening temperature during the week previous to inoculation was 99.7° to 101°. There was dullness over the upper half of the right chest, with bronchial breathing and a medium-sized infra-clavicular cavity. There was dullness over the fourth, fifth, and sixth ribs anteriorly on the left side, but no râles. For the past six months he has had continued chest pains and liquid movements daily for four months. He has been unable to work for the past six months. He received his first inoculation on February 13, it being one milligramme. There was no rise of temperature above 100° until seven milligrammes were given on February 25, a dose which produced a rise to 101.2°.

No further reaction occurred until March 19, when twenty-two milligrammes produced a rise to 101.5°, and on the 20th, to 101.6°. Treatment was continued without reactions up to a dose of forty-five milligrammes on April 22. The report June 24

reads: "Suffered attacks of pleurisy after he left the hospital, and lost flesh until he was down to his original weight." On April 23 râles disappeared and chest pains had subsided; his sputum amounted to four drachms daily, and he had one to two daily solid normal movements. The cod-liver oil taken previous to treatment was continued.

Morphia and bismuth were administered for forty-eight hours.

Weight on February 9, 1314.

Weight on February 16, 128<sup>1</sup>/<sub>4</sub>.

Weight on February 30,  $130\frac{1}{2}$ .

Weight on April 24, 1401.

Gain 12 pounds since treatment commenced. June 1, 1892. For past year has labored at outside and inside work as tinsmith, having good general health and strength. Coughs little. Physical conditions not apparently changed.

Case 1. Gain in weight from January 27 to April 23, 17 pounds.

Case 2. Gain in weight from February 17 to April 23, 20 pounds.

Case 3. Gain in weight from February 23 to June 14, 12 pounds.

Case 4. Gain in weight from March 13 to April 28,  $10\frac{1}{4}$  pounds.

Case 5. Gain in weight from February 8 to July 7,  $3\frac{1}{2}$  pounds. Case 6. Gain in weight from March 18 to April 23, 3 pounds.

Johnson, 37 years of age, residence in Florida for four months. His mother died of tuberculosis. The patient has had chest affections for fifteen years, and fever and night-sweats for many months. On entrance, left chest shows dullness and moist râles down to the fifth rib, and a medium-sized cavity at third rib. Sputum on entrance six ounces daily, with numerous bacilli. Evening temperature 99.5° to 100°. He received his first inoculation on March 4, one milligramme. His temperature reached 101° F. on March 18 and 23. On the 28th and 31st it reached 100°. His temperature continued below 100° during April. On April 22, forty-five milligrammes were administered, producing reactive temperature to 100.5°. His maximum dose on the 29th was sixty milligrammes, when he is reported to have left the hospital. His normal weight 170 pounds, entrance weight 153 pounds, final weight 157½ pounds. He received twenty-one treatments, and no medicine was administered. He was reported as being at standstill since treatment ceased. June 1, 1892. Left hospital. Has not since reported.

Lamon, age 48, residence Florida. There was dullness over the entire left chest with small moist râles over the upper and larger râles over the lower lobe, where also there were small cavities. The disease followed pneumonia. On entrance, his temperature 100.8°. He received first inoculation of one-fourth milligramme on March 14. The dose was increased without reaction until two milligrammes produced 102.8°. The dose was then reduced to one milligramme from April 2 to April 23, during which time the maximum temperature never exceeded 99° F. The last dose was five milligrammes. Eighteen treatments were given. During the first three weeks of treatment, diarrhea was excessive and persistent; during last three weeks it was checked, and improvement was perceptible. The sputum on entrance amounted to two ounces daily; during the last week of treatment one-half ounce daily. His normal weight was 132 pounds, on entrance his weight was 119; end of the third week of treatment 112, at the end of the sixth week 115 pounds. He reported on June 24: "Left hospital soon after your departure, unchanged." June 1, 1892. Not reported.

King, 39 years of age, residence in Florida for two years; he has no hereditary tendency to tuberculosis. Cough and gradual wasting had existed for three years. He was under observation in bed from March 19 until March 27. From March 14 until March 19, his maximum temperature ranged at or above 102°. His right chest down to eighth rib presented dullness; bronchial breathing, numerous moist râles, and a large infra-clavicular cavity. The left apex to second rib showed marked dullness, bronchial breathing, and small râles. The sputum measured 20 drachms daily, and contained abundant bacilli. His first inoculation was given on March 1, one-eighth milligramme. On March 27, onefourth milligramme produced reactive fever of 102°. The maximum temperature continued between 102° and 103° until April 10, when it fell below 100°, so continuing under treatment until April 24. As soon as the temperature fell to 100°, doses of tuberculin were again gradually increased, reaching three and onehalf milligrammes on April 24, without reaction. His normal

weight was 138; weight at the beginning of observation, 103¼; weight at the beginning of inoculations 99½ pounds. He was reported June 24, as "still under treatment by doses of 25 milligrammes; weight 103¾ pounds maximum; temperature 99.5° and 100.5°, appetite improved, sleeps well, night-sweats occasionally, cough about the same." Died of tuberculosis in November, 1891.

Mrs. Lindsay, age 45, residence in Florida for years. There was no hereditary tendency to tuberculosis. The hæmoptysis eight years before, since which time she has gradually failed; cough and wasting of flesh increased since February 1. Dullness and râles were present over the whole right chest above the seventh rib; over fifth and sixth ribs anteriorly, indications of a medium sized cavity were present. Bronchial breathing was present at the left apex; on April 3, she received her first inoculation of one-fourth milligramme; on April 23, 3 milligrammes; on April 3, her weight was 112; April 23, 115 pounds. Treatment was continued two weeks longer. It was reported on June 24, "Miss Lindsay calls herself cured; she says she is better than she has been for years." June 1, 1892. Enjoys excellent health. Coughs and expectorates little. No advance of physical condition. Able to attend to all ordinary labor.

Hyde, 23 years of age, six months in Florida. His father and mother died of tuberculosis. Has been failing for the past twenty months. The left chest presented many moist râles over the entire surface with entire dullness, and a large cavity between second and third ribs anteriorly on the right side, apex dullness and moist râles down to third rib. High evening fevers with profuse night-sweats contraindicated inoculations, and the patient was placed in bed, remaining there during four weeks, until temperature fell to 101°. During this time his weight had fallen to 111 pounds. Treatment began on April 3, with one-eighth milligramme. He received his maximum dose on April 23, one and one-fourth milligramme. He showed no reactions. His normal weight, 155; entrance weight, 116; at beginning of treatment, 111; on April 23, 113½ pounds. It was reported "after your departure Hyde left hospital unchanged."

The advanced cases were rapidly failing before treatment began.

Climatic influences remained unchanged. In all, appetite improved, decline in weight was checked, and the disease was stayed.

In the chronic cases decided improvements were obtained, in the acute ones slight improvement. No unpleasant, complicating or dangerous conditions were aroused.

In concluding our brief account of the treatment of tuberculosis by Koch's lymph, fever reaction having been prevented, it may appropriately be mentioned that too much has been demanded of this remedy. Eager hope of rapid cure, not held out by the discoverer, rendered the usually conservative medical mind ready to accept at first what approached the miraculous. The delicacy of lung tissue, with its readiness to inflammatory infiltration and the formation of connective tissue, makes the question of complete restoration with absence of physical signs one for years to determine.

All that can be logically demanded is improvement; a check in the downward progress, a commencement in the building up. This result tuberculin, employed watchfully and with attention to detail, has accomplished. Months may pass or years, yet no patient will find this treatment unsatisfactory who sees his life bark drifting further away from the fatal eddy. Restoration to perfect physical strength, if achieved at all, must be sought along this same humble, often uneven path of improvement.

# THE DOUBTFUL EFFICACY OF A HOT, DRY CLIMATE IN DISEASE.

By THOS. DARLINGTON, M.D., BISBEE, ARIZONA.

THE published statements relative to any particular climate are, as a rule, so colored with personal or pecuniary interest, either of the narrator or of the inhabitants, or are made so largely from hearsay description, that they are not to be depended on as the truth in the matter.

It is popularly supposed that the dryer the climate, the more beneficial it is in certain diseases, notably those of the respiratory organs.

Now, while I cannot absolutely deny this theory, more especially as numerous authorities assert it to be true, my own experience does not lead me to accept this view, but compels me to take the pessimistic side of the question, leaving it for you to judge of my conclusions.

It is generally admitted by both the profession and the laity, that uniformity of climate is to be preferred both in health and disease to a variable one; that is, one in which the changes are not very great.

The most noticeable fact relative to a very dry climate is that it is conductive to great variability of temperature.

Authorities seem to be agreed that temperature is relative, and depends largely upon humidity.

In mountainous districts, where the climate is very dry, and the atmosphere clear, radiation takes place quickly, and the earth is more rapidly cooled than near the coast, where the atmosphere is laden with moisture.

Thus changes in temperature are more speedy.

One may be riding in December, in southern Arizona, with the sun so hot as to necessitate the removal of the coat; and then going under a cloud we may even have a flurry of snow, so great is the change. Thus the difference between the sun and the shade is very perceptible at all times. Though by far the greatest change is between day and night, it may vary fifty degrees or more in twenty-four hours. Sometimes, in winter, there are days that require summer underwear, while at night I have found it impossible to keep warm under six blankets.

On December 24th, 1889, while riding at midday, my Hicks' thermometer registered in my vest pocket 109°; and that same night nearly two inches of ice formed in the horse-trough.

The importance to the invalid that the difference between day and night temperature shall not be very great cannot be overestimated. It is an absurdity for writers on the subject to say that such changes are not felt because of the dryness of the atmosphere.

Phthisis and nearly if not all diseases affect the nervous system, and produce in invalids a susceptibility to changes in temperature; and these changes, instead of producing stimulation, tend to cause irritability, wasting and depression.

The variability is not, however, the most prejudicial feature of a hot, dry climate, for by reason of both the heat and the dryness a larger amount of moisture is constantly thrown off from the system; and, unless this moisture be immediately supplied by drink, the various organs in the body suffer from a lack of fluid and their functions become perverted, as hyperæmia of the surface is always associated with anæmia of the internal organs.

That more moisture is thrown off by the lungs in a dry climate where the atmosphere rapidly absorbs moisture, is not only a matter of easy conjecture, but has been conclusively proved by experiments.

One of these experiments, in Dr. Dennison's able paper, shows that the excess of transpiration of Denver over Jacksonville in twenty-four hours is 3961 grains—over eight ounces.

Although not having made actual experiments myself, I am well convinced by clinical observations that in the mountainous districts of Arizona, where the air is as rare as at Denver, on

account of the heat, this transpiration and loss of moisture is much greater.

That there is also an excess of vapor thrown off by the skin and surface of the body is equally true. For this reason the mucous membrane of the mouth, nose and fauces becomes dry; and often during sleep this dryness is in such a degree that the mucous membrane will become fissured.

At first the amount of mucus secreted is in excess; but the rapid evaporation of the water leaves a large quantity of mucus behind; and this, becoming inspissated in the ducts of the secretory glands, plugs the duct, and either the follicles cease entirely to perform their functions, or they become inflamed and enlarged. Thus follicular pharyngitis and tonsillitis are very frequent. Thus, also, chronic rhinitis is an almost universal complaint. Occasionally we find persistent aphonia, due to the dryness of the vocal cords, in persons otherwise in perfect health.

Again, from repeated inflammation of the throat, and from dry and impacted cerumen, otitis and deafness are common. In numerous cases of bronchitis expectoration is light; and by the mucus becoming more tenacious, it is extremely difficult to dislodge.

The liver ceases to properly eliminate effete materials from the system. For this reason also the urine is less in quantity, and there is an increase in the solid constituents (the specific gravity is generally 1028).

It is not uncommon, especially in hot weather, to find persons who urinate only once or twice in a day; though it is more common to find those who suffer from a slight cystitis, on account of the concentration of the urine, and who have an almost constant desire to urinate, though they pass but little in quantity. For this reason also the kidneys become irritated.

Very obstinate constipation follows, as, in order to make up for the loss, water is absorbed from around the fæces. If there has been any fæcal fermentation, ptomaïnes markedly deleterious in their effects are taken up into the system; and these produce fever, headache, and a whole train of symptoms, sometimes simulating typhoid in character, and on other occasions causing intense neuralgias. By far the most constant effect, however, is the loss of body-weight. This is noticeable in almost all who come to the southern part of the territory; but especially those who come from the East, or from those places where considerable humidity exists. Of fifty-eight persons of whom inquiry was made relative to the loss sustained, but one had gained. Of the rest, the average loss per person was over thirteen pounds; and this all from those in fair health. The length of residence in these cases varied from two months to two years, though the loss was usually sustained in the first three months. It is noticeable also that those in poor health lost more than those who were well.

It is of importance to all invalids, and particularly to the consumptive, that we shall do all in our power to prevent a loss of weight. This is our main fight in wasting diseases—that the loss in body-weight from fever and other causes shall be compensated for by such remedies as tend to build up the system, as arsenic, cod-liver oil, and the hypophosphites, and by a most generous and nourishing diet. Why then should we send our patients to a climate that produces the opposite to what we desire?

## THE SIMULTANEOUS OCCURRENCE OF THREE CASES OF LEPRA IN ONE FAMILY.

A Contribution to the History of Leprosy on the Eastern Coast of the United States.

By W. H. GEDDINGS, M.D.,

AIKEN, SOUTH CAROLINA.

During the past thirty or forty years isolated cases of leprosy have occured from time to time in the city of Charleston. In 1882, the late Dr. J. F. M. Geddings, at the request of Dr. Jas. C. White, of Boston, who at the time was engaged in the preparation of a paper on the prevalence of leprosy in the United States, collected a list of all the cases of the disease that had occurred in Charleston from 1847 to 1882. They were seventeen in number. A few years later another case was sent to me for treatment by Dr. F. L. Parker, of Charleston. She was not a resident of the city, but of a neighboring village on the coast. Add to these the three I am about to describe and we find that twenty-one well-authenticated cases have occurred within the last thirty-four years, all but one being residents of the city.

These cases throw but little light on the etiology of the disease. They were nearly all young adults, or persons of middle age. They embrace every grade of society from the descendants of the old Huguenot families, who migrated to this country hundreds of years ago, down to the humblest domestic servant. Four were Jews, and the others Christians; sixteen were whites, four mulattoes, and one a full-blooded negro. They were all natives, and, with the exception of one, whose parents were Irish, their ancestors had lived in the country for a number of years. As the negroes predominate in this section, the fact that only five out of twenty-one were colored would indicate that here this race is less

liable to the disease than the whites. In one instance a mother and her daughter were affected with the disease, and in another a father and his son. Whether these were instances of contagion or heredity, I am unable to say.

In South Carolina the disease appears to be confined almost exclusively to the sea-coast, as I have heard of but one case in the interior, and that may have been contracted on the sea-board. It will be remembered that this is also the case in Norway. These unfortunates are in no way restrained, and, when not too ill, may often be seen walking about the streets of the city. Their appearance excites commiseration, but no one fears to come in contact with them. They live with their families, but mingle freely with the outside world. In no case, except the two doubtful ones mentioned above, have they ever been known to communicate the disease to others. The number of lepers in the city at any one time has varied from one to three, and as the disease has never evinced the slightest disposition to spread there has never been any fear of its becoming epidemic. How long this will remain the case is doubtful, as my friend, Dr. Jas. C. White, tells me that it is spreading rapidly in Louisiana and Florida.1

With a view to continuing the history of leprosy in Charleston I present the clinical history of the following very interesting cases:—

Family History.—Of the paternal grandparents nothing is known. The father was a Sicilian by birth, and by profession for a short time a sailor. He made several voyages between Sicily and New York, but there is no reason to suppose that he ever visited countries in which leprosy is endemic. He soon abandoned the sea and removed to Charleston, where he was engaged in business for a number of years, and eventually died there of congestion of the brain.

The mother is a strong, healthy woman of 58 years, who has borne twenty children, eight of whom are still living. She comes

<sup>1</sup> Since the completion of this paper I have received from Dr. Jas. C. White a copy of his latest article, "Some of the Dangers incidental to Professional Life," from which I quote the following: "Fifteen years ago, it was scarcely known that outside our Scandinavian States there was a leper in the country; now there are one hundred in one town in Florida alone." Page 8.

of native parents whose family history presents no peculiarities worthy of note. On neither side is there any evidence that the ancestors suffered from leprosy.

General History of the Development and Course of the Disease.— In the autumn of 1885, Charleston was visited with a severe evelone, which inundated portions of the city with salt water from the adjacent rivers. The family inhabited a house in the inundated district, and had stored in the cellar some of their carpets and other articles of household furniture. Two days after the flood, when the water had partially subsided, two of the sons and one of the daughters, all apparently in perfect health, undertook to remove the damaged effects, and to accomplish this work were compelled to wade through water which reached to their hips. The water is said to have presented a dirty greenish appearance. They were engaged in this work for two days. evening of the second day, while drying themselves before an open fire, they all noticed a number of blisters on the legs, and in every case confined to the outer side of the left. These bullae, at first about half an inch in diameter, gradually enlarged, and finally coalesced into large blebs, extending from the external maleolus half way up the leg. They were filled with a clear serous fluid of a bright yellow color. In the course of two or three weeks these lesions gradually dried up and desquamated, leaving purple spots, which later on assumed the appearance of white cicatrices. As the bullæ disappeared it was noticed that the affected area was devoid of sensation. The skin then assumed a brownish-yellow color, almost bronzed, resembling that of an American Indian, especially on those portions of it which were exposed to the action of air and light, as in the case of the face, neck, and hands. Tubercles were developed over various portions of the body, but were larger and more sharply defined on the face and ears than elsewhere. Between the tubercles the skin was much thickened, in some situations hanging in folds, especially where it is loosely attached, as, for instance, below the lower lids. The natural wrinkles over the face were exaggerated into deep furrows. The tubercles over the eyebrows, nose, and ears were, as stated above, more prominent and larger than elsewhere,

and, with the thickening and wrinkling of the integument, gave to the face the lion-like expression so characteristic of leprosy.

I will now present a brief clinical history of each of the cases. Case I.—F. A. is now 24 years old. In the autumn of 1886, while apparently in perfect health, he assisted his brother and sister in removing their damaged effects from the flooded cellar. On the evening of the second day, while drying himself before the open fire, he observed a number of blisters on the lower and outer half of the left leg. To avoid repetition, I would state that the subsequent course of the disease corresponded in almost every respect with the general description just given. In his case the disease continued to advance for two years, during which he was quite ill and suffered greatly with pain in the parts affected. Early in 1890 the general cutaneous hypertrophy began to diminish, and sensation reappeared in many situations, which had hitherto been anæsthetic.

Status præsens.—The patient is bright and cheerful, and tells me that of late he has been able to do some work at his trade, which is that of a carpenter.

The skin where it is exposed to the light and air is of a dark brown color, almost bronzed, and is raised in folds corresponding in their direction with the course of the natural wrinkles, which latter are three or four times as deep as they should be in so young a person. In some situations where the hypertrophy is very marked these folds are thick and pendulous, especially below the lower lids where the parts present the bagged appearance observed in ordema. Tubercles of various sizes, but none larger than a pea, are scattered over the face, being largest and most numerous over the eyebrows, nose, and ears. Viewed as a whole, especially when quiet, his face presents the characteristic leonine expression.

The trunk and extremities are also brown, but of a much lighter shade than the face. Irregularly distributed over the surface are numerous white patches, resembling *leucopathia partialis*, but rougher and not so white as in that disease. Over the left elbow the skin is still devoid of sensation. The integument over the left leg, like that over the body generally, is of a brown color, except on its outer aspect, where it is interspersed with purplish or white patches, which have taken the places of the bullæ observed

at the outbreak of the disease. These spots or patches resemble the cicatrices left by a burn of moderate severity. They are still anæsthetic. The hair has disappeared almost entirely from the diseased surface, and what little remains is short, dry, and brittle. The hair follicles are filled with a mass of dried scales of epidermis, and are surrounded by a small purple areola, a quarter to half of a line in diameter. Over the trunk the hair has begun to grow again. The scalp has never been affected and is covered with a vigorous growth of bushy hair.

The general health of this patient is excellent, and he is quite sanguine of his ultimate recovery.

Case II.—R. A., 17 years old, a younger brother of F. A., was affected at the same time and in the same manner as his elder brother. After exposure to the heat of the fire, bulke filled with serous fluid appeared upon the external half of the left leg, chiefly over the ankle and knee, which, after having dried, became white maculæ. These spots were devoid of sensation. The disease soon appeared on the face, then on the trunk, and finally on the upper extremities, pursuing the same course as in Case I., except that his general health was much more seriously impaired.

Status præsens.—The patient is slender, poorly nourished, and very anæmic. His face presents the characteristic leonine expression, but the tubercles are not so large, nor is the skin so much hypertrophied as in the case of the elder brother. Over the right arm there are numerous white maculæ, but there is no anæsthesia. On the left lower extremity the skin over the knee and ankle, which at the outbreak of the disease was the seat of numerous bullæ, is white and devoid of sensation.

Case III.—A. A. is 20 years of age, is a sister of the young men whose cases have just been described; she worked in the stagnant salt water with the men; like them had an eruption of bullæ on the outer surface of the left leg. These gradually underwent desiccation, leaving in their places white patches, which were so devoid of sensation that a needle could be passed through the skin without causing the slightest pain.

Status præsens.—The patient is slender and much emaciated. The chest is flat and contracted, and for some time past she has had cough and vesperal fever. Her general appearance is that

of a person well advanced in phthisis. The face is brown, with tubercles over the eyebrows, nose, and ears, but with less of the leonine expression than is observed in her two brothers. The right forearm is of a dark brown color, but shows no impairment of sensation. The left forearm is even darker than the right, with irregularly shaped patches, which were at one time purple, but are now quite white and decidedly anæsthetic. The skin of the left leg presents the same appearance as that of her two brothers.

Remarks.—This is the only instance on record in this country in which leprosy has attacked three members of a family at the same moment. All three had worked in stagnant salt water for two days and were simultaneously attacked while drying themselves before an open fire, and in each case it was the left leg that first presented evidences of the disease, and invariably on its external aspect.

Whatsoever the remote etiology of the disease may have been no one will doubt that in these cases the exciting cause was heat acting upon skin which had been previously softened and perhaps irritated by continuous immersion in salt water. We know but little in regard to the etiology of this much-dreaded disease, and I have therefore thought that it would be best to place the above cases on record.

### DISCUSSION.

Dr. R. G. Curtin. I have seen four cases of leprosy in Philadelphia—all advanced cases when they came to our city.

About five or six years ago I was called to see a woman, the wife of a planter in Cuba, who had come to the North on account of her health. I found a strange eruption of the skin. I called Dr. Van Harlingen in consultation upon this case, which I had been poring over for a couple of weeks, and was very much astonished when the doctor announced that it was a case of leprosy. About three or four years before that time the woman had been attacked by a sudden illness, following which leprous manifestations presented themselves. She had a family of nine boys.

After living in the neighborhood of Philadelphia two or three years, one of her boys came to me and said: "Doctor, I find that when I stick a pin in that part of my hand I don't feel it." I found that the hand was anæsthetic at that point. The family disappeared from Philadelphia, and that is the last I heard of them. The woman associated intimately with her children, fondling and often sleeping in the same bed with them; yet none of the younger members of the family seemed to have a disposition to take the disease. Where she obtained the disease she could not state. They had lived on their plantation near the sea-coast.

Two other cases were of daughter and mother, who went to Brazil, contracted the disease there, and afterwards came to Philadelphia and died. The origin of the disease could not be traced.

The fourth case was that of a Chinaman, whom I saw in the Philadelphia Hospital about two years ago. He was found by the police (he having been deserted by his fellows, probably because they were afraid of the disease) and sent to the Philadelphia Hospital. He was afterwards taken to the Municipal Hospital, where I believe he still remains.

These are the only cases which I have ever seen. They had all contracted the disease outside of the United States.

Last year I drew up a resolution that Congress be memorialized to establish a leper colony. I did not take the action suggested by the resolution for the reason that I understood that the boards of health throughout the United States were about uniting upon some definite plan in regard to such an establishment. I am awaiting their action.

Dr. E. O. Otts. Two years ago I had an opportunity to visit the leper hospital at Holde, in Norway, where I saw a variety of cases of leprosy of all ages, from the child to the old man. Improper hygiene, rather than climatic conditions, was considered to be the exciting cause of the disease, particularly a diet of stale fish, although I believe this is denied. One case I recall which had been in the hospital for thirty years, and all the cases, as I remember, seemed to be regarded as hopeless. At that time there were about twelve hundred lepers in Norway, and the number was decreasing from year to year.

## ON THE CLIMATIC TREATMENT OF CHRONIC DIARRHŒA.

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In these remarks I shall refer not only to cases which deserve the name "chronic diarrhea," but to that large class in which the presence of mucus in varying amount in the stools, without diarrhea, points to the colon as the seat of disease. There are few of us who have not had to deal with protracted and obstinate cases of one or the other of these forms of chronic intestinal catarrh. After many trials and much labor, medicinal and dietetic treatment fails utterly to produce a permanent cure, and our patients, as much disheartened as ourselves, abandon all hope or begin a course of experimental therapeutics on their own account.

For the purposes of this paper, I shall divide cases of this sort into two classes, applying the suggestions as to climatic treatment more particularly to the latter.

The first of these is the simpler and primary form of chronic intestinal catarrh, with or without follicular ulceration. The causes of this form are bad food, privation, exposure, foul air, etc.; and its type is to be found in the chronic diarrhœa of armies, prisons, and camps, and in so many of the pensioners of the government, as a result of camp and prison life of the war.

The disease as we see it most frequently in civil practice is, however, in its nature and origin a very complicated affection, being preceded by long periods of ill-health, marked by chronic indigestion and various nervous disturbances. It is most common between the ages of 35 and 40, when the cares and responsibilities of life are at their maximum. A great strain is then brought to bear upon the individual in the support of an increas-

ing family, or in the wear and tear of a large business. In the case of women, it can be traced to frequent child-bearing, and to the many exactions of nursing and rearing of children. In both men and women it is the last link in a long chain of events.

Nervous fatigue and overstrain have been followed by gastrointestinal indigestion, hepatic disorder and constipation. Perhaps neurasthenia, lithæmia and gouty phenomena have appeared. Sooner or later the stools contain mucus, either alone, passed in shreds or bands, or else the mucus floats in a fluid, diarrheal discharge. When the patient has reached this stage we have to deal with a most intractable disease. I ask any one present to take up the life-history of a case of chronic colitis with or without diarrhea, occurring in the overtaxed professional or business man, still more in the overtaxed child-bearing woman, and see whether there has not been a long history of nerve overstrain, before indigestion, constipation, and mucous fluid stools began. So common is this mode of onset that I am disposed to search for the cause of all cases of chronic colitis in the perturbations and strains of the nervous system, which are brought to bear first upon the higher cerebral faculties.

The disease is a very complex one, and the difficulties which follow all efforts at cure are explained by its nature. In some cases, relaxation from work, a proper diet, combined with other measures, will result in benefit, or even cure, under home treatment; but often the one thing needful cannot be obtained at home, and after repeated and tedious trials no result is reached. It is then that we must adopt necessary and radical measures by insisting upon cessation of work, relief from all care and change of residence and climate.

By pointing to the necessity for heroic measures it is not often that we can fail to compel our patient to give up everything for the time being, and to devote himself to his cure alone. Chronic colitis is by no means well when the diarrhœa is arrested, and recurrences soon show that the lesion is there, although its chief symptoms have been temporarily suspended. To secure a complete restoration of the intestinal coats to their normal state, to get rid of thickened submucous tissue and of chronic vascular distention and glandular hypertrophies, a long period of apparent cure must pass; and the aim is not so much to stop diarrhea, as it is to place the mucous membrane beyond the point of liability to fresh congestions and cell infiltrations, from internal irritation or external chilling. If, therefore, this treatment is to be attempted at all, it is well to fix a limit of time, which will give a reasonable probability of complete cure. This time should be from three or six months to a year, according to the nature of the lesion and the degree of debility, emaciation, anæmia, etc.

In what way should change of climate be secured; by travel, or by remaining in some one appropriate locality? And what principle should guide us in the choice of a suitable climate?

I do not believe that travel is beneficial except in a limited number of cases. If the disease be not of long standing, if the diarrhea be not marked, or easily controlled by dietetic regimen, and if the individual can be relied upon to follow implicitly rules of diet, etc., then travel may be approved of. It is not enough, however, to send such patients away from home on long journeys, with the idea that relief from business cares alone will cure them; and the formula of a European trip with all its attendant objections is still less to be thought of. It will take but a short experience to show that while European travel will give the required mental relaxation and pleasure, it fails in almost every other respect to meet the indications; so that while milder cases of intestinal catarrh, as duodenal catarrh and constipation, associated with depression and hypochondriasis, are benefited or cured by the changed conditions in the nerve centres under the influence of the charms of sight-seeing in Europe, yet for more advanced forms of colitis with diarrhea, such a course is most prejudicial. In the case, however, of those who have such a penchant for Europe that no other place will suit them, if it is Europe or nowhere, the dangers and objections may be obviated by avoiding travel, for a time at least, and selecting a climate in Europe where all the other requirements are found; and no country supplies so great a variety of climate, of mountain, plane, or sea, as does the continent of Europe.

I have, however, seen cases where a trip to Europe, with the injurious incidents of sudden changes of temperature, improper diet, fatigue of movement, and want of proper nursing, have

resulted in an aggravation of the disease, or an unnecessary delay in its cure. The principal object of treatment, the removal of all existing causes of strain of the nervous system, is, of course, gained through the pleasures of travel, especially of travel in Europe, but the disadvantages are so great and so numerous, even in mild cases, that one would hesitate to advise it unless it be undertaken under the direct care of the physician, or of a well-instructed nurse.

Ocean voyages have been very warmly advocated, but the fact that constipation is a most prevalent condition at sea is no reason for its advocacy. In fact a sea-voyage of short duration, as in crowded trans-Atlantic steamers, gives no promise of benefit whatever. An ocean voyage in a sailing vessel, or yacht, in favorable seasons of the year, is not open to the same objections. It has been found that cases of subtropical diarrhea are frequently benefited by the long voyage from India to England, but this is not always the case. I know instances of cases of chronic diarrhea, contracted on the South American coast, which have been in no way improved by the long voyage homeward. On the contrary, the inconveniences of shipboard, the difficulty of procuring appropriate diet, and the want of attention to hygienic rules, all tend to aggravate the malady; and, moreover, there is this one important consideration, no one who is not known to be absolutely exempt from sea-sickness should ever be subjected, by way of treatment, to the horrors of an ocean-voyage.

The injurious effects of long sea-voyages, where changes are made from temperate to hot climates, and *vice versa*, have been well shown by the observations of Surgeon Rattray, of the Royal Navy (Proc. Royal Soc., London, 1870–1):—

"A slowly . . . . progressive impairment of the physique . . . . occurs during long sea-voyages in which ships pass repeatedly and suddenly from cold or temperate to tropical latitudes and the reverse."

In a total of 138 persons weighed during such a voyage, 65.22 per cent. lost weight, the average loss being 6.93 pounds, but ranging from 1 to 23 pounds. This is not true of long voyages in temperate zones. In a long voyage where the temperature ranged from an average of 69° F. in one locality to 65° F. in

another, out of a total of 132 cases observed there was a gain of weight in 69.69 per cent., the gain averaging 5 pounds; 19.69 per cent. lost flesh, the loss ranging from 1 to 9 pounds. The younger men and boys gained, while their seniors showed no gain or loss. Although, however, this is true in many cases, yet other data show that there is "a constant ebb and flow in the state of health during long voyages." In a voyage of 230 days, 65.05 per cent. lost weight, the loss varying from 1 to 32 pounds; while only 27.18 per cent. gained. This voyage included stays in such healthful climates as Madeira, Simons's Bay, Sydney, Brisbane, on a health-giving, fresh-meat, vegetable, and lime-juice diet.

Granted, then, the necessity for absence from home and relief from causes which negative all home treatment, what climate is preferable for these cases?

There are three conditions which are desirable:—

1st. Surroundings which shall best meet the indications for relief from mental care and give as great a degree of pleasurable diversion as is possible, and thus act favorably on the nervous system.

2d. A climate which will give the greatest activity to the digestive processes, including the appetite, and to nutrition.

3d. Meteorological conditions which will lessen the danger of "taking cold;" that is, of inducing congestive attacks of the gastro-intestinal mucous membrane through sudden changes of temperature.

1. In considering the first question, the locality in which the patient resides, his individual tastes and aptitudes, as well as the gravity of his case, must be taken into account. In every individual there are certain tastes and idiosyncrasies which should be made of help in choosing a residence. Artists, sportsmen, lovers of scenery or haters of scenery, literary men, business men without literary tastes, tired lawyers, physicians, and clergymen, all have peculiarities and tastes which demand thought in the choice of the medium in which they are to live and upon the successful influence of which so much depends.

The views of authors are not well defined as to the most favorable climate for chronic diarrhœa; but the prevalent opinion held is, I believe, that a climate of great equability, and where the aver-

age temperature is high rather than low, is to be preferred. The feeling among patients, too, where the matter is left to their decision, is that a warm climate is better for them and that they cannot stand cool and cold weather. The argument for an equable climate has much force, as sudden and marked changes of temperature have such an unfavorable effect; but as great equability can only be secured through prevailing winds which bring the more uniform temperature of the ocean atmosphere, loaded with moisture, we cannot have equability without humidity; so that the question is between a warm, equable, and moist climate or one which is cooler, more variable, and dry. I contend that between these the preference is habitually and wrongly given to the warmer climate in the treatment of chronic diarrhea; that in Europe patients are sent to the Mediterranean littoral, and in this country to Florida and to the warmer sea-shore and warm inland regions in summer rather than to localities of low temperature. If we were to see in chronic diarrhea the intestinal disease only, and not the complex morbid state of the whole organism, this choice would still be an unwise one. In chronic diarrhea it is the whole man who needs treatment, and it is only by a combination of the largest number of favorable influences in the environment, acting on the nervous system, the digestive and nutritive processes, as well as on other functions, that a cure can most quickly and thoroughly be obtained.

The languor of mind and body which prevails in warm weather and in hot climates is due to diminished energy in the nervous system and to impaired nutritive activity in all the tissues. In those whose nervous systems are easily influenced by the environment, heat affects appetite and deranges digestion. How much more is this the case where the digestion is enfeebled by disease and where diarrheea exists!

There are many other reasons why a warm climate is not beneficial to the anæmic, debilitated sufferer from impaired digestion and chronic diarrhea, but these are enough to show into what false security he may be lulled by the specious arguments for a climate which will permit him to lie out of doors all day, and where there are no sudden changes of temperature, no need of fires and no necessity for movement or exertion.

The circulatory and respiratory functions are more languid in a hot, but more active in a cold, environment. Digestion and appetite, which directly depend upon the respiration and circulation, are consequently more active in cold than in warm climates. If we can provide for our sufferer a climate in which the last conditions are secured, and at the same time have the most agreeable mental impressions brought to bear upon him, we have the essentials of a climate for the treatment of chronic diarrheea.

3. A low temperature, in contradistinction to a high one, is not, however, the only desideratum, for if cold be combined with extreme dampness, as on the sea-shore in summer or winter, the most perfect climate is not obtained. A low temperature, with humidity, is not found in this country in summer, unless combined with altitude, and in winter on lower mountain-ranges and elevated table-lands. The possible injurious effects on chronic diarrhea of a variable low temperature in elevated regions is offset by the dryness of the air which permits exercise without perspiration and chilling of the surface. No one who visits such a climate for the first time can forget that delightful sensation of violent exertion without the resulting uncomfortable feeling of being chilled and taking cold afterwards. There is less danger of "taking cold," in the sense of there being less danger of internal congestion from contraction of peripheral cutaneous vessels in cold dry air, than in moist, warm air; and in these forms of chronic intestinal catarrh there is established such a close relationship and sympathy between the skin and the intestinal lining that the slightest variation of external temperature will produce sudden exacerbations of the disease. I have known the patient to become so keenly alive to this danger as to be a monomaniac on the subject of draughts and changes of temperature.

The typical climate for chronic diarrhea should have a low temperature, as equable as possible, combined with great atmospheric dryness, with a dry porous soil, a clear sky, and with little rain-fall or snow-fall. To these conditions must be added the pleasures of fine scenery, agreeable companionship, with opportunities for amusement, without which but little progress can be made in the treatment of this ofttimes rebellious disease.

As one man's experience is necessarily limited, I would not

venture to suggest an invariable rule of selection. Each case will require advice based on its gravity, the degree of anemia and debility, peculiarities of temperament, and other conditions. In *summer* for severe cases the Catskill and Adirondack and White Mountains, or other regions of 1500 to 2500 feet elevation, are well fitted. Many other localities in the Appalachian Range will be found to have all the requirements. In Virginia, North Carolina, and Georgia, there are many suitable localities, but in midsummer the more Northern resorts are to be preferred, because the temperature is lower, and for the reasons given a low temperature is to be preferred.

I have no exact data which will enable me to say how the Rocky Mountain region compares with our own mountains, but I believe that in Colorado, New Mexico, and other States and Territories, extreme elevation offers no objection whatever, and that all necessary qualifications are found there. No doubt much may be said on this subject by members of this society from Colorado and elsewhere, who are familiar with the effect of very high altitudes on chronic intestinal inflammation.

The milder forms of the disease, in which there is a recurrent but not constant diarrhea, not of long standing, may be sent in summer to the sea-shore of Virginia, Delaware, New Jersey, or Long Island, where bathing in water of not too low temperature may be allowed. The more chronic forms, however, with liquid, membraniform, or mucous discharges, are made worse by the sea air, and should not be sent there in summer and still less in the winter season.

For a winter residence, the mountain region of western North Carolina and northern Georgia are peculiarly fitted, more so than the colder Adirondacks. Aiken and similarly situated elevated regions may serve for those unable to stand the mountains. The merits of southern California and of Colorado and New Mexico, as winter homes for such cases, also deserve consideration.

The drawbacks of hotel life are not so great as may be supposed. Competition and the increasing demand for comforts and luxuries in health-resorts provide the health-seeker with almost any convenience he may need, and it will not be difficult for him to find in a suitable climate all the assistance which comes from a comfortable home and kindly care.

It is not my wish to extol the merits of any section for the cure of this disease, but rather to draw attention to the necessity of cure by residence in an appropriate climate, and to the real climatic conditions to be sought for. And although my remarks may have a somewhat dogmatic tone, they are founded upon instructive experiences, which have taught at least what climates are to be avoided, and what mistakes may be made by an undirected patient, when pleasure is the chief object sought, and when no positive advice is given him as to what he needs.

#### LYMPHATISM.

By F. H. BOSWORTH, M.D.,

NEW YORK.

THE terms "lymphatic diathesis," "lymphatic habit," "lymphatic temperament," etc., are expressions in common and frequent use; and yet to my mind, and probably to most, they convey an exceedingly vague and indefinite idea, and one not so much of a diseased condition as of a tendency to certain forms of disease. In other words, a person possessing a lymphatic diathesis or habit, is not practically suffering from any form of disease; and yet when disease develops in such an individual, it is liable to assume a certain type.

I have used the term "lymphatism" to define a condition which, while perhaps closely related to what is often designated as the lymphatic diathesis, yet constitutes, I think, a far more definite condition than that usually conveyed by the above expressions, as shown by the systemic habit, and certain specific local manifestations which attend it. The diseased condition to which I should apply the term lymphatism consists in that peculiar constitutional habit under the influence of which the lymphatic glands in the neighborhood of the fauces become the seat of certain morbid changes, which usually assume a hypertrophic form. Furthermore, when these changes have once set in, the systemic influence is shown by a marked tendency to progression and ultimate permanence. The point which I desire to emphasize in this connection, and which, perhaps, is the main object of the paper, is that these glandular enlargements in the throat are not to be regarded so much as simple homologous tumors as evidences of a constitutional habit.

Etiology.—Perhaps no fact in clinical medicine is more universally recognized than that lymphatic enlargements are the result

of heredity. This is evidenced, perhaps, more by the fact that we see, in numberless instances, a number of children in the same family with enlarged faucial glands, than by directly tracing it to similar troubles existing in either parent.

Manifestations.—Embryology teaches us that in the development of feetal life the epiblast, folding in from without, and the hypoblast, from within, meet for the formation of the intestinal canal at the point which subsequently becomes the faucial arch. Clinical teaching still further shows us that such a point of meeting of embryonic folds becomes the favored point for neoplastic development. The most active tendency to neoplastic formation in child-life undoubtedly has its seat in the lymphatic glands. Lymphatism belongs essentially, therefore, to this period, and its manifestations consist in almost purely hypertrophic changes in the lymphatic glands located at this point of meeting between the epiblast and hypoblast. Practically the lymphatics in this region form almost a complete ring surrounding the entrance to the pharynx. The prominent local manifestation of lymphatism, therefore, consists in hypertrophic changes—first, in the lymphatics in the vault of the pharynx, constituting what is usually termed adenoid disease of this region; second, in those lymphatics which are situated between the pillars of the fauces, constituting hypertrophied tonsils; and, third, in the mass of glands situated at the base of the tongue, constituting an hypertrophied lingual tonsil. In addition to the above lymphatic manifestations, and in connection with them, we not infrequently find the superficial cervical and submaxillary lymphatics undergoing a moderate amount of hypertrophic changes. On account of their location, perhaps, these, however, give rise to no notable symptoms, and show no tendency to progressive action.

I would confine the term lymphatism, therefore, to those cases which are characterized by the local manifestations already described, excluding instances in which the lymphatics become the seat of notable enlargement and suppurative changes. Where such occurs, I should consider it an evidence of the still more profound constitutional condition usually designated as scrofula, adopting the view so well expressed by Potain, who, while

<sup>&</sup>lt;sup>1</sup> Dic. Enc. des Sciences Med. Paris, 1870, vol. iii. p. 485.

asserting that the two conditions are distinct one from the other, acknowledges their relation in the statement that lymphatism is an exaggeration of a condition, normal in child-life, but which carried one step further constitutes scrofula.

In the same way necessarily, we exclude from lymphatism, Hodgkins's disease and kindred affections.

The systemic character of lymphatism is shown not only by this tendency to local hypertrophies in the fauces, but also by the fact that in many instances, children suffering from enlarged faucial glands show notable evidences of impaired general health. Of course, we easily understand how a child with a pharyngeal adenoid or enlarged tonsils, giving rise to interference with free respiration, disturbed sleep, and other symptoms due purely to the local conditions, might thereby show evidences of impaired nutrition. I think, however, that the general condition is something more than that which results from local conditions. Perhaps the most prominent general symptom is the anæmia which so frequently attends lymphatism.

The whole tendency of the later investigation of the function of the lymphatic glands by Schmidt, Stöhr, and others seems to show that they serve an important purpose in the generation of white blood-corpuscles. The involvement, therefore, of notable groups of these glands in diseased action necessarily tends to hamper the cytogenic capacity of the economy, resulting in a more or less well-marked anæmic condition. This view, of course, is somewhat speculative, and based on the theory that the source of the red corpuscles is the white corpuscles, and that the diminution of leucocytes results in an anæmic condition. However this may be, anæmia is often a prominent symptom of enlarged faucial tonsils, the more marked according to the extent of the lymphatic disease.

Course and Prognosis.—The disease generally develops quite early in life; and, in the large majority of instances, manifests itself in the masses of glands which we designate as the faucial and pharyngeal tonsils. Occasionally the condition is congenital,

<sup>&</sup>lt;sup>1</sup> Zeitsch. f. wissensch. Zoologie, vol. xiii. p. 221.

<sup>&</sup>lt;sup>2</sup> Virchow's Archives, vol. xcvii. p. 211.

but probably in most instances it develops between the ages of three and six. Involvement of the lingual tonsil, as a rule, occurs somewhat later in life.

When the local diseased condition has set in, the hypertrophic changes occur somewhat rapidly, and the lymphatic hypertrophies attain a large size in a comparatively short period of time, the rapidity of development being dependent very largely on the activity of the systemic condition, although this unquestionably is notably stimulated by bad hygienic surroundings, such as insufficient clothing, improper food, unnecessary exposure, badly ventilated living and sleeping rooms, etc. These local hypertrophic changes are usually somewhat rapidly progressive during the first From the age of nine or ten up to puberty the decade of life. progress is much slower. After puberty, certain retrograde changes take place, which consist practically of an atrophy. commonly said that these enlarged lymphatics disappear with puberty. This I regard as an entire mistake. Under the influence of repeated attacks of mild inflammation, together with the mechanical injury to which they are subjected in the act of deglutition, etc., there is in connection with the lymphatic hypertrophy a certain amount of connective tissue hypertrophy. These connective tissue fibres, after full development, contract, as is always the case, while at the same time the lymphatic glands shrink up to perhaps one-quarter or one-eighth their normal diameter. result is a marked diminution in the size of the enlarged faucial or pharyngeal tonsils; and yet the morbid tissue still remains, and even in this atrophied state may become the source of trouble-It should be understood that I regard the some symptoms. systemic condition, or the lymphatism, which has been so active in its development, as having practically ceased with the progressive stage of the development of the morbid process; in other words, the lymphatism is a disease that is to be regarded as limited by the attainment of puberty, although its local manifestations may be persistent.

Treatment.—In the earlier years of life, when this condition of lymphatism first manifests itself, I think it is to be regarded as an affection easily amenable to treatment, and for which we possess almost a specific in some of the preparations of iodine. In

my own experience I have found no preparation more efficient than the iodide of iron. I think the mistake is ordinarily made of administering this drug in too small doses. The most common form of administration is in the officinal syrup, which contains about five grains to the fluidrachm; to a child we usually give from five to eight drops of this—something less than half a grain. A child five years of age, in order to obtain the best effects of the drug, should take at least two grains three times daily. may be given in the form of the syrup or the Blancard pill. Where the local manifestations of lymphatism have persisted for two or three years, we can undoubtedly correct the constitutional habit by the administration of internal remedies, but its local manifestations, in most instances, at this period, have progressed too far to be completely absorbed in this way; hence it becomes of the greatest importance to recognize the condition at its onset, and arrest it by proper medication.

In those cases in which the enlarged glands are no longer amenable to internal medication, there is no question in my mind as to the propriety and even the imperative duty of removing the offending tissue by surgical interference. Local applications I regard as absolutely useless. Local treatment may remove a temporary condition of hyperæmia or subacute inflammation, but does not produce absorption of organized tissue. Of course no fixed rule can be given in regard to these cases; and yet I should be disposed to say, that in a majority of instances, in children under five years of age, the local manifestations of lymphatism can be reduced by internal medication. Our therapeutic efforts. however, should not be confined to the administration of medicine. for I regard as of almost equal importance the enforcement of certain hygienic rules. A child with a large adenoid growth or hypertrophied faucial tonsils is liable to repeated colds, which develop in mild attacks of acute inflammation in these glands. This habit is to be corrected by general measures. The most important of these I consider to be the wearing of all-wool material next to the skin, in that we possess no fabric which in a less degree hampers the normal functions of the skin and promotes a healthier activity than woollen, and immunity from colds is probably best secured by proper attention to the cutaneous functions. As second in importance I regard the daily sponging of the skin, even of a young child, with either cold water or water with the chill removed. In addition to this, the avoidance of excessive outer clothing, the proper ventilation of sleeping apartments, proper regulation of the diet, together with plenty of out-door life and exercise, will so far aid the purely medical part of the treatment as to secure the most favorable results in probably the large majority of instances of this affection, which occur during the tenderer years of life.

I have seen a number of cases, in my own experience, which in former years I should not have hesitated to subject to immediate operative interference, in which the carrying out of the above hygienic measures, together with the internal administration of iodide of iron in full doses, has resulted in the complete disappearance of the local manifestations in the throat, together with the complete arrest of the constitutional condition of lymphatism.

The point, therefore, which I would emphasize in this paper, is that we should not content ourselves with saying to the parents of children who have even small hypertrophied glands in the throat in the form of enlarged faucial or pharyngeal tonsils, that they will require no interference and will disappear with puberty, but that the existence of these enlarged glands, even though they may not be of sufficient size to give rise to notable symptoms, should be accepted as evidence of the presence of lmyphatism, and that the child should be immediately subjected to the measures of treatment above indicated, and these persisted in, until all local manifestations have disappeared.

## DISCUSSION.

Dr. Thomas Darlington. Although entirely unprepared to speak on the subject, I should like to say a few words; for during the past two years I have seen many cases of lymphatism, principally those of cervical adenitis.

I entirely agree with Dr. Bosworth that in the chronic cases the best method of treatment is the administration of the iodide of iron; while in the acute cases we must vary the treatment largely according to the case, although often we cannot ascertain exactly the origin of the case. Frequently the cause is specific. In an epidemic occurring amongst the Mexican population of the town where I reside, in some of the cases there was no rise of temperature, and in fact no systemic symptoms whatever, except lassitude. In these cases the cervical glands alone were affected.

Starting from one house the disease spread until there were many cases. I was unable to ascertain the cause; but should say that there was to my knowledge no scarlet fever or diphtheria in the neighborhood. Apparently no reason existed for the disease. In other cases, however, I was able, as I thought, to trace the cause to the absorption of ptomaines from a fermentation of the fæces. In these cases there was a rise of temperature, and the tonsils were involved; but in all of them the color and pyridic odor of the fæces were indicative of a particular change which took place.

The treatment consisted simply in the giving of a laxative or cathartic, generally calomel, and in three or four days the symptoms entirely disappeared.

I merely mention this epidemic as something peculiar it itself.

Dr. A. Jacobi. I have not heard all of Dr. Bosworth's paper, but listened to his remarks on treatment, and may be allowed to say that a small addition could profitably be made to the contents of the paper in that connection.

I have not frequently been in the habit of looking upon lymphatism as a disease per se, as an independent disease. I look upon it in most cases rather as a result, and I believe that this view may have been omitted from the paper, because I heard no allusion to that subject in the part of the paper relating to treatment. The doctor's treatment consists in the administration of remedies for the accomplished fact; I heard nothing about prevention.

As a general thing glands will not swell independently. When we come to deal with glandular tumors of the usual type we know that almost every case is the result of local irritation. A so-called scrofulous gland of the neck will not swell independently, but is the result of local irritation about the mouth, ears, neck, etc. In

intense diphtheritic inflammation of the naso-pharynx there are large glandular swellings, part of which may remain. When a small number of glands are swollen and become indurated the next tier of glands will swell, and that process is liable to continue. It is a very common occurrence. In such cases the so-called scrofulous habit becomes established; but if at first the eczema had been interrupted, if the chronic catarrh had not been permitted to go on, the first glands would not have been tumified at all, and the adjoining glands would certainly have escaped danger.

In the summer-complaint of childhood we have as early as the first day, in consequence of the inflammation of the mucous membrane, a swelling of the neighboring lymph-bodies; they will in time become indurated, and then form the so-called "scrofulous" mesenteric glands, which could have been averted if the original trouble had been interrupted—if no diarrhoea had been allowed to go on.

Therefore I say that I could have wished to hear something said about prevention. Certainly we see many cases that are beyond cure, for as soon as the induration consists of organized tissue it is too late to expect anything from the administration of absorbent drugs.

### CREASOTE IN PULMONARY DISEASE.

By WM. C. GLASGOW, M.D. St. LOUIS, MO.

Creasote has long been used in medicine, and its virtues have often been extolled by writers in medical journals, but it has not been received by the general medical profession with the favor given to other tried and established remedies. Many have tried it and failed to obtain the promised results, and others have found under its continued use a disturbance of the gastro-intestinal tract and of the kidneys. After a long and full experience with the drug, I believe that I have found the reason for such unsatisfactory results, and wish in a short paper to give my own experience, extending now over a period of six years.

In the year 1885, after reading Jaccoud's article on the "Curability of Phthisis," I commenced using creasote in the manner advised by this distinguished writer. The results, however, were not satisfactory; but, believing strongly in the theoretical value of creasote, I continued its use in an experimental manner.

The experiments in the bacteriological laboratory have proved that the addition of creasote to the culture-medium retards and antagonizes the growth and development of the micro-organisms, not through a destruction of the micro-organism, but by rendering the culture-soil unfavorable to their development and multiplication. If this be true in the laboratory with selected culture-media, it will probably be equally true in the human organism, if the tissues of the body can be thoroughly saturated and thus become an unfavorable culture-ground for their growth and development. To accomplish this without producing harm or disturbance to the individual has been the problem. The peculiar property of creasote, whereby its presence interferes in a minimum

degree with the enzymes, having a weak action on the pepsin and no action on the ptyalin (Lauder-Brunton), renders it one of the few drugs which can be used with prudence. To "creasote" the lung the usual small doses of creasote are inadequate, and it is only by large and long-continued doses that we can hope for the desired results.

What may be called a maximum or sufficient dose of creasote will vary greatly in different persons. The maximum dose is the dose pushed to the point of tolerance, or the dose which can be taken continuously without producing disturbing symptoms. Different individuals show the greatest difference in tolerance, and some show positive inability to take even the smallest dose, the symptoms of creasote poisoning being produced by minimum doses.

The secret of the tolerance of large doses consists in the choice of the creasote and in the manner of administration. After trying the various creasotes in the market I am firmly convinced that there is only one preparation which is really suitable for administration in proper quantities. The English beech-wood creasote, prepared by Morsen, has in my practice been tolerated better and in larger doses than that of any other maker. The older the creasote the better the toleration. I do not know why this preparation of creasote should be better tolerated than that prepared by other manufacturers. It is almost identical in synthetical analysis with that prepared by Merk; but as a result of clinical experience it is a fact, although it cannot yet be explained.

The choice of a vehicle is an essential factor in the creasote treatment. It must be given in a manner to produce the least irritation of the stomach, and at the same time in such a palatable form that it can be continued for a length of time without producing distaste and disgust. The accidental experience of a patient five years ago induced me to use milk as a vehicle, and this I have found to be the best and most acceptable medium. Some persons, however, cannot take milk in even the smallest quantities, and for these another mixture must necessarily be selected. Next to milk I have found California port wine to be the most acceptable, and there are few who cannot take creasote in this manner. Great diluting of the mixture is essential.

In using milk I always dissolve the creasote in a drachm or two of whiskey and add this to one-half pint or more of milk, to be taken immediately after meals. The creasote added to a wine-glassful of port wine, then freely diluted with water, may be taken in the same manner. According to my experience a patient may take creasote in either manner continuously for months without acquiring distaste or repugnance and without producing gastric disturbances.

It has been far superior in my hands to the usual glycerin mixtures, which, especially in summer, prove so distasteful to the patient. Occasionally in using creasote we find a condition of "biliousness" produced. There is headache, nausea, with vomiting and possibly purging. The use of the blue pill with a saline laxative, with the discontinuance of the creasote for a few days, will cause this to disappear.

The internal use of creasote in the form of pills or capsules has not given me the same satisfactory results. Guiacol, which is deemed more pleasant by some, is in my opinion inferior in its effect.

As the peculiarity of each patient must be considered in each individual case, and the degree of tolerance can only be learned by experiment, it is necessary in every case to commence with small doses and gradually to increase until the point of tolerance has been ascertained.

In my own practice I commence with two drops and increase each dose by two drops every three days. When the point of tolerance has been reached—which is shown by eructations, gastric disturbances, or the minor symptoms of creasote poisoning—the remedy is discontinued for two days and recommenced on the third day with a dose two drops less than the one which produced the disturbance; 10 or 15 drops is an average individual dose, or from 30 to 60 drops a day. Many, however, can take even larger doses with complete tolerance; I have four patients who are taking 25 drops at a dose or 75 a day, and one who has gradually increased his dose until now he takes 37 drops three times a day. These large doses can be taken continuously for two or three months. At these times I find it beneficial to intermit the treatment for a week or ten days; then again to recommence with the same dose.

As the object of the treatment is to creasote the patient as quickly as possible, the addition of the creasote inhalation and creasote inunction will be of benefit. I have not found the dry inhalations of creasote of especial value and have obtained better results from the inhalation of creasote added to hot water. The vaporization of the creasote has seemed to me quite useful in many instances.

I am convinced of the value of the creasote ointment with vaseline as a base. This may be freely applied to the chest, and absorption obtained through flannel compresses.

That the system becomes thoroughly saturated by these means is clearly shown by the condition of the skin. The perspiration takes on the odor of creasote, and in one of my cases a peculiar eruption followed its use. This man had taken five drops of creasote three times a day for three weeks. The eruption consisted of pin-head sized vessicles, most abundant on the abdomen and thighs. The contents were at first a limpid fluid which later became of a brown color. It continued for two weeks, disappearing with a discontinuance of the creasote and leaving a faint brown stain.

Whether the creasote fully accomplishes the purpose of defertilizing the pulmonary tissue cannot yet be positively stated, but that it has proved to be a powerful factor, used in conjunction with other measures which improve the assimilative power and promote the nutrition of the body, is a fact which seems to me to have been clearly established by clinical experience. It certainly does not diminish the number of bacilli, but seems to lessen the toxic influence exerted by them, and in the present uncertainty between dead and living bacillus its real influence upon the bacillus remains problematical. In this connection the following case is of interest:—

I. W., a stockman living in the Pan Handle of Texas, arrived in St. Louis with cattle. He had had hemorrhages and night-sweats, with cough and muco-purulent expectoration. This showed the white specks which, when examined under the microscope, proved to be masses of the bacilli of tuberculosis. An examination of the lungs gave the physical signs of catarrhal alveolar phthisis of each summit. He commenced the use of

creasote and returned home. Two months later he returned to St. Louis and reported that he had constantly taken the drug until he was now taking 45 drops a day. He was much improved in every way, had gained ten pounds in weight, had lost his cough in a large measure, and his expectoration had somewhat diminished. This, however, presented now the same character as that seen before, and when it was examined microscopically showed the bacilli in a greatly increased number; in fact, it resembled more a pure culture of the laboratory than human sputa. Whether these were living bacilli or Prudden's dead bacilli I am unable to say.

According to my own experience, creasote has a more certain and marked effect in some forms of lung disease than in others.

In miliary tuberculosis I have not seen the slightest benefit. In fibroid degeneration of the lung the effect has been scarcely noticeable. This is also true of disseminated tuberculosis of the lung, although in some of these cases a certain temporary improvement of symptoms was noticed. In catarrhal phthisis I believe that we obtain striking and positive results from this treatment. The general symptoms, such as fever, sweats, the cough, and expectoration, are all modified and in many cases entirely disappear. There is an increase in weight, and patients appreciate the fact that the drug is doing them good.

From an analysis of 30 cases, extending over a period of four months, prepared in my clinic by my assistant, I find the following result:—

In 10 cases of first stage phthisis, there was marked gain in all—the cough, night-sweats, and expectoration were all decidedly improved or disappeared. The moist râles lost their fluidity and became dry crackling.

Of 11 second stage cases, three are marked "no improvement;" the others show an improvement in varying degree.

Of 14 third stage cases, 8 showed no sign of improvement, and of these several died. In the others, there was an improvement in cough and expectoration, with an improved appetite. In private practice we obtain better results than are seen in public dispensaries. The general conditions surrounding the patient are better,

and more efficient measures are practicable to promote the nutrition and strength of the patient.

It is in cases of chronic cellular bronchitis or cellular bronchopneumonia that we find the most satisfying results of the creasote treatment. In a paper prepared by me for a former meeting of this Association, but not read owing to my absence, and later published in the March number of the American Journal of Medical Sciences, 1889, I described the acute form of this disease in detail.

The last work of Finkler, of Bonn, "The acute infectious pneumonias," fully corroborates many of the facts stated in my paper, and in an exhaustive manner describes the disease as a cellular infiltration of the mucous membrane and alveolar walls.

In the chronic form we find symptoms and physical signs almost identical with those seen in tubercular lungs, and hence the condition is often regarded as tuberculous. In fact the lung substance in this condition seems to be a most fertile soil to develop the tubercular bacillus, and in many of these cases we find the bacillus in the sputa. It can then be classed as one of the many forms of tubercular disease. In other cases the bacillus cannot be found, although symptoms and physical signs fully correspond to those found in tubercular cases. The results of creasote in a case of this character are strikingly shown by the following example:—

Mr. T. A., a resident of Chicago, was sent to Colorado three years ago by an eminent member of this Society as a consumptive. He had profuse hemorrhages, night-sweats, with cough and expectoration (no bacillus in the expectoration); he remained in Colorado a few months, had repeated hemorrhages, and, finding that he was growing worse, returned to Chicago. From thence he went to Thomasville, Georgia. Still he seemed to become progressively worse—he had frequent hemorrhages, and suffered great emaciation and loss of strength. I saw him first in April, over two years after his first attack. He gave the same story of hemorrhages, night-sweats, dyspnœa, and cough, with muco-purulent expectoration without bacilli.

On examination, the right lung gave a general wooden percussion resonance, exaggerated vocal and pectoral fremitus, and numerous

moist subcrepitant râles, largely on inspiration, with some sibilant râles. The left apex gave the same signs in a minor degree.

He commenced creasote in April, taking at first two drops; and when I last saw him, in the middle of August, he was taking 37 drops three times a day. As he was constantly increasing his dose he is now probably taking more.

The greatest change has come over his condition, and he considers himself practically well. His strength is greatly improved, he has increased in weight, has a good appetite and good wind. His sweats have ceased, he still coughs a little, and expectorates a small amount. The abnormal physical signs have entirely disappeared from both lungs, and the latter are now practically in a sound condition.

With or without the bacillus, such a case would undoubtedly be called tuberculosis; and it is cases like this which have probably given such satisfactory results under modern treatment.

As the pathological condition is simply a cellular infiltration, and as there are no structural or fibroid changes, with a subsidence of the condition the lung structures will after the attack be in a normal condition.

THE INFLUENCE OF HIGH ALTITUDES UPON HEREDITY IN TUBERCULOSIS AND ITS EFFECTS UPON SOME FORMS OTHER THAN PULMONARY.

BY H. B. MOORE, M.D., COLORADO SPRINGS, COLORADO.

On first going to Colorado, now two years since, it soon became a matter of much interest to the writer how to account for the rarity of phthisis, which undoubtedly existed among the inhabitants of the State, and for the remarkable benefit experienced by the majority of phthisical invalids going there. theories proposed to explain this relative immunity, and the valuable therapeutic influence accompanying it, seemed inadequate from my standpoint. For example, it is frequently asserted that the rarity of phthisis at high altitudes is due to the absolutely pure and asceptic condition of the air and sparsity of population, and that as soon as these conditions cease to exist, by reason of the influx of population and the growth of large towns, the immunity also ceases. This view seemed sufficiently controverted by the condition of affairs at Denver and Pueblo, which are large, growing towns and certainly not more conspicuous for their attention to matters of hygiene than towns of similar size in other parts of the world; and yet, I think, there can be no reasonable doubt that tubercular affections rarely originate in either city and that imported cases receive benefit. Again, it is claimed by others that dryness is the special feature that is desirable. Against this hypothesis may be mentioned the facts, on the one hand, that many high altitude points in Switzerland and in the Andes, which are not dry in a sense that we consider dry in this country, there is a relative immunity; and, on the other hand, in low, dry countries like portions of Egypt, California, and Australia, the percentage of recoveries from phthisis compares unfavorably with results obtained at high altitudes. Still others believe that it is no one of these influences, but a combination of altitude, dry air, and out-of-door life in a sunshiny climate that brings about the good result. This is a very sensible and probably very correct view; but it is still a matter of great interest and fundamental importance in its bearings upon our notions of the climatology of phthisis to analyze and come as near as we can to a correct estimate of the relative importance of these different factors. As a result of my studies and reflections upon the subject during the year following, I wrote an article which was published in the New York Medical Journal, September 20, 1890, in which the following summing up of conclusions was given:—

"We owe the immunity in Colorado, then, chiefly to the physiological effects of high altitude. This is powerfully supplemented by extreme dryness, while the almost unbroken sunshine and favorable temperature lead to a maximum amount of out-of-door life, rendering the specific action of altitude thoroughly available. Probably no one of these climatic attributes would be sufficient in itself, but the sum of these conditions effect such a change in the human economy, viewed in the light of a medium for tubercular cultivation, that it becomes unfitted to the end; and, in cases not too far advanced, this influence antagonistic to tubercular process is so strong that it becomes antidotal and a most valuable therapeutic agent."

Since then it has occurred to me that it would be a matter of much interest to ascertain how the hereditary transmission of tubercular affections was affected by residence at high altitudes, and whether this relative immunity extended to other forms of tubercular disease. Such facts would not only be of interest in themselves, but, if reliable, would afford a valuable hint as to the modus operandi of the therapeutic influence which exists—e. g., if it were found that tubercular joint-diseases were rare in Colorado, and that when imported they received benefit, it would modify our notions concerning the manner in which pulmonary tuberculosis received benefit, for certainly benefit to joint-tuberculosis could not be due to any local influence of climate, and we would be justified in the presumption that too much importance was

being attached to the theory concerning the effect of atmospheric attenuation upon defective functional activity of the apices. As a result of these considerations, and there being no statistics of any kind upon the subject, I decided to make an attempt to collect information upon the subject by means of a circular letter, addressed to the leading members of the profession practising in the State, and got up the following:—

COLORADO SPRINGS, COLORADO, July, 1891.

DEAR DOCTOR: With a view to collecting some information as to the influence of high altitudes upon the hereditary transmission of tubercular affections, and also to ascertaining whether, in the opinion of the profession practising in this State, forms of tuberculosis, other than pulmonary, such as tuberculosis of the joints, meninges of the brain and cord, skin, etc., are rarer than elsewhere, and whether imported cases of such forms of tubercular disease experienced any alteration in the usual clinical course, I venture to so far trespass upon your time as to ask answers to the questions which follow, and trust that the importance of adding to our knowledge of the subject and the possible significance of facts thus elicited will be sufficient excuse. Full answers to the questions, with the statement of any interesting facts of personal experience suggested by them, will be specially appreciated. In replying, please refer simply to number of question without repeating:—

1. If your practice has been in a community much resorted to by sufferers from phthisis, have the children born in Colorado, of such parents—one or both having phthisis—been prone to the same disease, or exempt from tuber-

cular and scrofulous affections?

2. Have you seen any cases of tubercular joint disease, originating in Colorado; and, if so, rarely or frequently, and was there any peculiarity in their clinical course?

- 3. Have imported cases of this description come under your observation, and has your experience of them been such as to make you believe they did better here than at low altitude?
- 4. Have you seen in your practice any cases of tubercular meningitis in infants and young children; and, if so, have such cases seemed rare or frequent, as compared with what obtains elsewhere?
- 5. State what has been your experience, if any, with other forms of tuber-culosis (not pulmonary).

Yours truly,

Seventy-two replies were received to this letter from physicians residing in various parts of the State, not including those from physicians in Colorado Springs, which, for convenience, and owing to the somewhat unique conditions prevailing there, will

<sup>&</sup>lt;sup>1</sup> Under this designation are included the terms hip-joint disease, or coxalgia, fungous synovitis, and white-swelling of the various joints.

be considered separately. Of these seventy-two, thirteen replied that they did not consider their knowledge of the subject sufficient to justify them in giving their opinion, leaving fifty-nine who gave opinions upon the subjects asked for. Some answered a part of the questions only.

In answer to the first question, as to whether children of tubercular parents in Colorado were prone to the same disease, or exempt from tubercular and scrofulous affections, forty-eight were of the opinion that they were exempt to a remarkable degree, four regarded them as prone, and six saw no peculiarity—i. e., they thought about the same influence of heredity was observed here as elsewhere. Several, who had the opposite opinion as to tubercular affections, regarded scrofulous affections as frequent; and I have since noticed that Hirsch, Muhry, and other writers, speak of numerous exceptions to the rule of coincidence of geographical distribution.

In answer to the second question, as to the frequency or the reverse of tubercular joint-diseases originating in Colorado, and as to the character of their clinical course, thirty had never seen a case originating in the State; twenty-six had seen cases originate there, but regarded it as of rare occurrence; and three thought it occurred as frequently as elsewhere. No one had seen it often. Of those who had seen it rarely, twelve said it seemed to pursue a milder course and one more amenable to treatment; while the remainder (eleven) thought the clinical course essentially the same as elsewhere. As might be anticipated, a priori, experience upon the third question, as to the effects of the climate upon the imported cases of tubercular joint-disease, was not large even in the aggregate. Thirty-four had had no experience with imported cases. Of the remaining twenty-five who gave answers to this question, twenty were satisfied that the disease was improved after coming to Colorado, and more amenable to treatment; while five could see no difference.

As regards the fourth question, which related to the frequency or rarity of tubercular meningitis in infants and young children, twenty-four physicians had never seen a case in Colorado, twentytwo had seen from one to four cases that they had so diagnosed in an experience of many years, while ten regarded the disease either as frequent or as common as in other localities.

Answers to the fifth question related principally to isolated instances of different kinds of secondary tuberculosis occurring in chronic phthisis, and developed nothing in the way of other forms of tubercular disease, except two cases of acute miliary tuberculosis, verified by autopsy, which had been seen by one physician.

As regards Colorado Springs, my information is, perhaps, of more value chiefly because it is of a more definite character. Here it was possible by personal interviews with physicians to get exact facts; while in addressing letters of inquiry to physicians in other parts of the State, I was unable to ask just how many cases of this and that form of tubercular disease have you seen. Such an exact answer requires more time and searching of records, even if such are kept, than one could venture to expect. The most that could be looked for was the statement of opinions with the hope that some exact information as to the number of cases would be volunteered. This hope was not unfounded, for in quite a proportion of the answers definite information was given. Secondly, information of this kind which relates to Colorado Springs is of more value from the fact that here are gathered a large number of sufferers from tuberculosis, there being no industries, and the population consisting entirely of invalids, their friends and those engaged in occupations incidental to the maintenance of a population of 12,000 inhabitants, most of the latter being themselves sufferers from the disease.

About a year ago, Dr. Adams, of Colorado Springs, after interviews with all of the leading physicians of the city—those whose experience covered its entire history—was able to learn of but seven cases of phthisis originating there. These, so far as I know, were all acute cases, and occurred in subjects strongly predisposed by heredity. I know of no cases originating there since then. As regards other forms of tubercular disease, I have made careful inquiry, and find that there have been eight cases of joint tuberculosis, thirteen of primary meningeal, and four of spinal tuberculosis, which have had their origin there; or, a total of thirty-two of all forms. This seems to me a very small number;

certainly fifteen to twenty-five yearly would not seem unusual in a community of twelve thousand inhabitants. It is so much the more remarkable when we reflect that there is scarcely a family in the town in which some one or more of its members has not suffered from the disease prior to going there; and that instances of one or both parents being tubercular are very frequent. So far as the State generally is concerned, while the number of answers received from the questions sent out was not large, they were from the most prominent practitioners, and certainly represent a large portion of the practice of the State; and as the separate facts gathered in Colorado Springs corroborate this view, I think we are justified in concluding:—

1st. That up to the present the offsprings of tubercular parents in Colorado, are, as a rule, exempt to a marked degree from tubercular affections of all kinds.

2d. That joint, primary meningeal and other forms of tuberculosis seldom originate in Colorado, either among those predisposed by heredity or others.

3d. That, so far as somewhat limited experience goes, imported cases of tubercular joint-disease pursue a milder course and one more amenable to treatment.

No one can be more conscious than myself of the difficulty experienced in drawing reliable conclusions from what data we at present possess upon these points. In the first place, although phthisical invalids are scattered more or less numerously throughout the State, quite a portion of its population is made up of the material common to newly-settled Western States, viz., a young and healthy element from the older communities of the East, who have gone out West to make their fortunes, and grow up with the country. This class of people, such as is found in newlysettled countries generally, is but little liable to suffer from tubercular affections. Another fact to be considered is, that excepting in two or three of the oldest communities in the State, the children born in Colorado have, as yet, scarcely arrived at that age at which the tendency to tubercular phthisis is most strongly felt. The future only can give us full and certain information upon these points. Nevertheless, making due allowance for these considerations, I believe that the immunity not only from pulmonary

tuberculosis, but from tubercular affections generally, is sufficiently striking and significant to be worthy of study. This is particularly true of towns like Denver and Pueblo, with their considerable size, industrial and confining occupations; and of Colorado Springs, with its large number of children from tubercular parents and families.

In so far, then, as these conclusions are justifiable and wellfounded, it would seem reasonable to infer that the anti-tubercular influence, which exists at high altitudes, is not by any means purely a matter of atmospheric attenuation with the increased pulmonary expansion and improvement of local nutrition consequent upon it; but that it is to a considerable extent a systemic influence, which antagonizes the origin and development of tubercle at all points through its effect upon the general nutrition. The infrequency of tubercular meningitis among infants would, of course, have no climatic significance so far as the infants themselves were concerned; but it would seem to be more reasonably attributable to a favorable condition of the parents rendering either the true hereditary transmission of the disease, or contagion after birth, unlikely. A greater frequency of this variety of tuberculosis in Colorado Springs than obtains elsewhere would have been no surprise to me, since chronicity of phthisis without absolute cure is so common among parents living there. Whether the immunity from tubercular affections, other than pulmonary, and improvement in their condition when imported, can be said to be sufficiently striking to have any special significance, beyond a general tonic influence with the wholesome effect of dry air, is difficult to say. Our facts are too meagre, and, even if plentiful, we have no data upon this subject from other parts of the world with which to compare them. Probably dryness of air, with its effects upon elimination by the skin and lungs, is a very important factor. According to Dobell, of London, the retention in the body of the products of bacterial and tissue life-leucomaïnes, ptomaines and extractives—greatly predisposes to bacterial invasion and domiciliation, these products constituting favorite feeding grounds and their removal the real raison d'être of microbes here as elsewhere throughout the organic world; and their presence the principal factor which determines habitat. The important influence of a high degree of dryness upon elimination is obvious; but, like so many other common facts, it is scarcely realized. Dr. Edwards, quoted by Lee, instituted, many years ago, a series of experiments upon frogs, to determine the influence upon elimination of different degrees of humidity of the air in motion and repose. He found that in the same space of time (other circumstances remaining the same except the hygrometric state) transpiration in a dry air was five or six times as great as in one of extreme humidity. The differences of transpiration were very marked, even in an atmosphere which appeared calm. The frogs which were exposed to an open window lost at least double the amount, and, according to the intensity of the wind, three and even four times the amount lost by those retained in the interior of the apartment. Add to this common effect of dryness some of the special effects of diminished atmospheric pressure, viz., a marked degree of general peripheral hyperæmia, with its stimulating effect upon the functions of the skin, and the intensity of solar radiation peculiar to altitudes and the manner in which elimination by these channels (skin and lungs) is augmented becomes evident.

But, however important dryness may be, the results obtained in phthisis, at high altitudes, precludes the possibility of regarding their climates as a mere happy arrangement of thermometric and hygrometric condition. The dryness of Colorado Springs, the Davos Valley, and the Engadine can be duplicated elsewhere, together with their thermometric range and sunshine, and often, it may be added, with good results; but if the statistics of cases tabulated by Weber, Denison, Solly, Fisk and others are reliable, they still fall far behind high altitudes in the percentage of complete and approximate cures—too far to be accounted for by any but a radical difference in the climatic influence. We must, then, still accord to altitude the first place as a factor, for we know of no high altitude region, whether wet or dry, where phthisis can be said to be frequent; and several of them now have large, populous towns. Furthermore, so far as yet tested, high altitudes, whether in South Africa, the Rocky Mountains, the Andes, or the Alps, exert a pronounced remedial influence upon the early stages of the developed disease.













